CONTRACT NAS5-967

NASA

GODDARD SPACE FLIGHT CENTER

NIMBUS

INSTRUCTION MANUAL

for the
HRIR MODIFICATIONS
to the
APTS GROUND STATIONS USING
FAIRCHILD FACSIMILE RECORDERS

RCA

ASTRO-ELECTRONICS DIVISION
DEFENSE ELECTRONIC PRODUCTS
RADIO CORPORATION OF AMERICA
PRINCETON, NEW JERSEY

INSTRUCTION MANUAL
for the
HRIR MODIFICATIONS
to the
APTS GROUND STATIONS USING
FAIRCHILD FACSIMILE RECORDERS

Prepared under

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AUTOMATIC PICTURE TRANSMISSION SUBSYSTEM
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Prepared for

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GREENBELT, MARYLAND

By the

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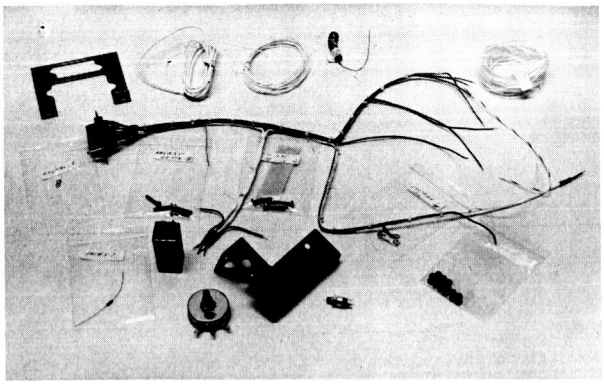

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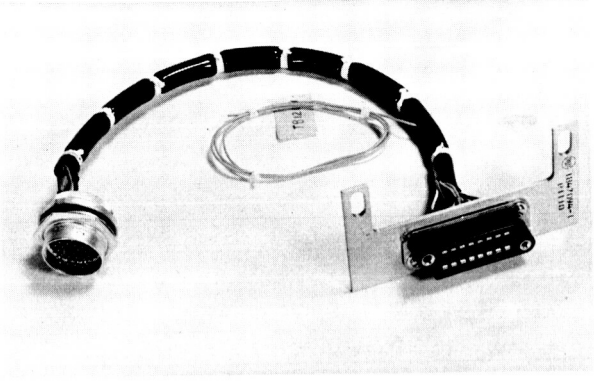

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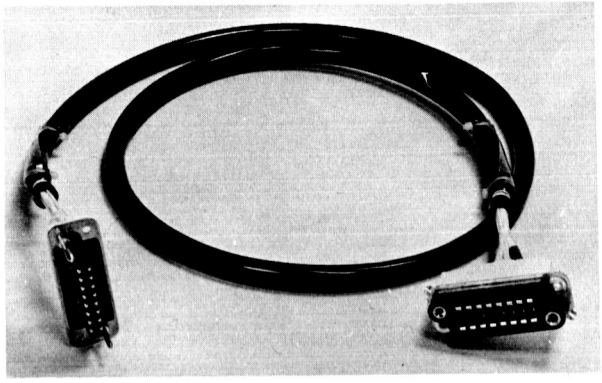

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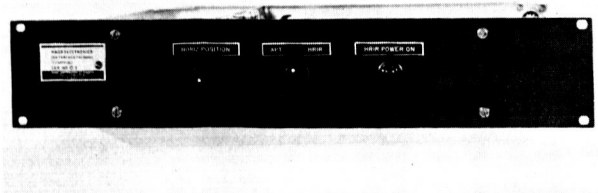

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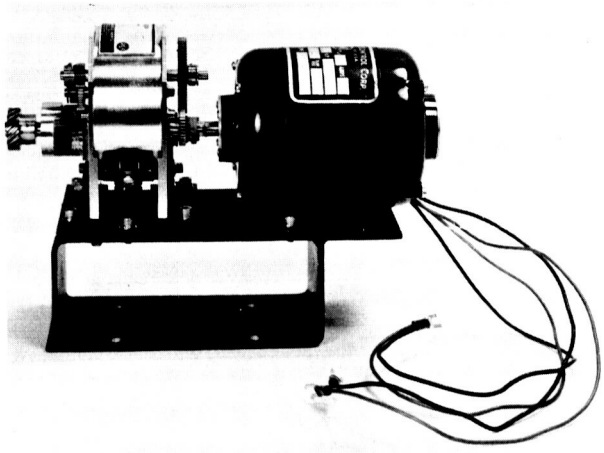

REDUCTION GEAR 65-11-210

Frontispiece. Modification Kit for HRIR Conversion of Fairchild APTS Ground Stations

SECTION I

INTRODUCTION AND DESCRIPTION

A. INTRODUCTION

1. Purpose and Scope of Manual

The purpose of this manual is to provide instruction and information necessary to install, operate, and maintain the modifications required to convert Fairchild APTS Ground Stations for processing High Resolution Infrared (HRIR) signals. The modifications were designed by the Astro-Electronics Division (AED) of Radio Corporation of America for the National Aeronautics and Space Administration (NASA), under Contract No. NAS5-667, Modification 86.

2. Purpose of Equipment

The purpose of this modification kit and installation is to provide each field location with the capability of recording the Nimbus spacecraft HRIR data on the Fairchild Facsimile Recorder. This capability is accomplished without affecting the APTS mode of operation.

B. DESCRIPTION

1. Physical

Modifications to the HRIR/APTS Ground Stations (HAGS) consist of the cable harness (W1), the Marking-Current Bracket, and necessary wire and hardware to install the modification in the Fairchild Electrical Chassis (Drawer); the necessary harness for modification of the Recorder intraconnection wiring; the motor and gear train assembly; and the HRIR Converter are shown on the Frontispiece. The HRIR Converter with its interconnecting cable is designed for rack mounting and has a standard 19-inch-rack front panel, 3-1/2 inches high, and a total depth of 15-1/2 inches. A power cable is an integral part of the unit. Operating controls are readily accessible on the front panel and a fuse holder and input/output receptacle are mounted on the rear of the unit. Internal circuits are fabricated on two circuit-board assemblies.

The complete list of equipment required for the modification is listed in Table 1.

TABLE 1. EQUIPMENT REQUIRED FOR MODIFICATION OF FAIRCHILD HAGS

Nomenclature or Description	Part or Identifying No.	Quantity Required
Fairchild Electrical Chassis (Drawer) Modification Kit		
Diode, IN457	CR505	1
Relay	RY 510	1
Potentiometer, 4W, 25 ohm	R503	1
Switch, Push-button	SW501	1
Harness Assembly, Drawer,	1848261	1
Bracket, Marking-Current	1848241-1	1
Bracket, Connector J1110	1847093-1	1
Screw, Pan head 8-32	8944148-17	2
Wire, 22AWG, Black	999128-99	6 ft
Wire, 22AWG, Gray	999128-8	3 ft
Wire, 22AWG, White	999128-9	1 ft
Screw, Pan head 4-40	NAS1635-04-6	2
Washer, lock	NAS1640-4	4
NUT, hex 4-40	8983158-102	4
Solder, 63/37	2010858-132	6 ft
Fairchild Recorder Chassis Modification Kit		
Clamp, cable	8811154-7	4
Extender Cable, 1W13	1848252-501	1
Harness Assembly, W1	1848265-501	1
Motor and Gear Reduction Assembly	1723737-501	1
HRIR Converter Modification Kit		
HRIR Converter Assembly	1723499	1
Adapter Harness 1W14	1848271	1

2. Electrical

The chassis harness connects the clutch and electronic circuits to the adapter harness via connector 1A6J1. The gear train and clutch assembly provide the means of reducing the facsimile recorder line rate so that it is compatible with the HRIR line rate. Circuitry is also provided for the reduction in marking current, a necessity brought about by the slower line rate in the HRIR mode of operation.

SECTION II

INSTALLATION PROCEDURE

A. GENERAL

Installation of the HAGS modification consists of the procedures outlined below. It will be necessary to refer to the Maintenance Manual for the Fairchild Recorder Assembly, the engineering drawings presented in Section VI and the following step-by-step procedure, to properly complete the modification. The item numbers specified are shown on the engineering assembly drawings or the photographs in the text.

B. PREPARATION FOR MODIFICATION

The following disassembly steps are necessary in order to perform the modification:

1. Remove the Recorder housing and the Electrical Chassis (drawer) in accordance with Paragraphs 6-4a(1) and 6-4a(2) of the Fairchild Operation and Maintenance Manual for APT Ground Station.
2. Remove the Recorder Frequency Standard Unit (F. S. U.) as follows:
   a. Disconnect connector J1102 from the F. S. U.
   b. Remove the four mounting screws on the bottom of the F. S. U. and lift the unit from the main chassis.

C. MODIFICATION PROCEDURE FOR THE ELECTRICAL CHASSIS (DRAWER)

1. Remove the wires connected to R138-3, R137-1, R156-1, R118-3, and R900-1.
2. Disconnect the yellow wire from TB1-1 and reconnect it to TB1-2. (This wire was connected to TB1-1 in common with C2.)

3. Remove the inboard brackets from connector A1 - A12 and connector A13 - A27. See RCA Dwg 1843736.

4. Assemble the following components to the Marking Current Bracket (item 3) as shown in Figure 1.

   a. Switch S501

   b. Potentiometer R503

   c. Relay RY510, use items 10, 11, and 8.

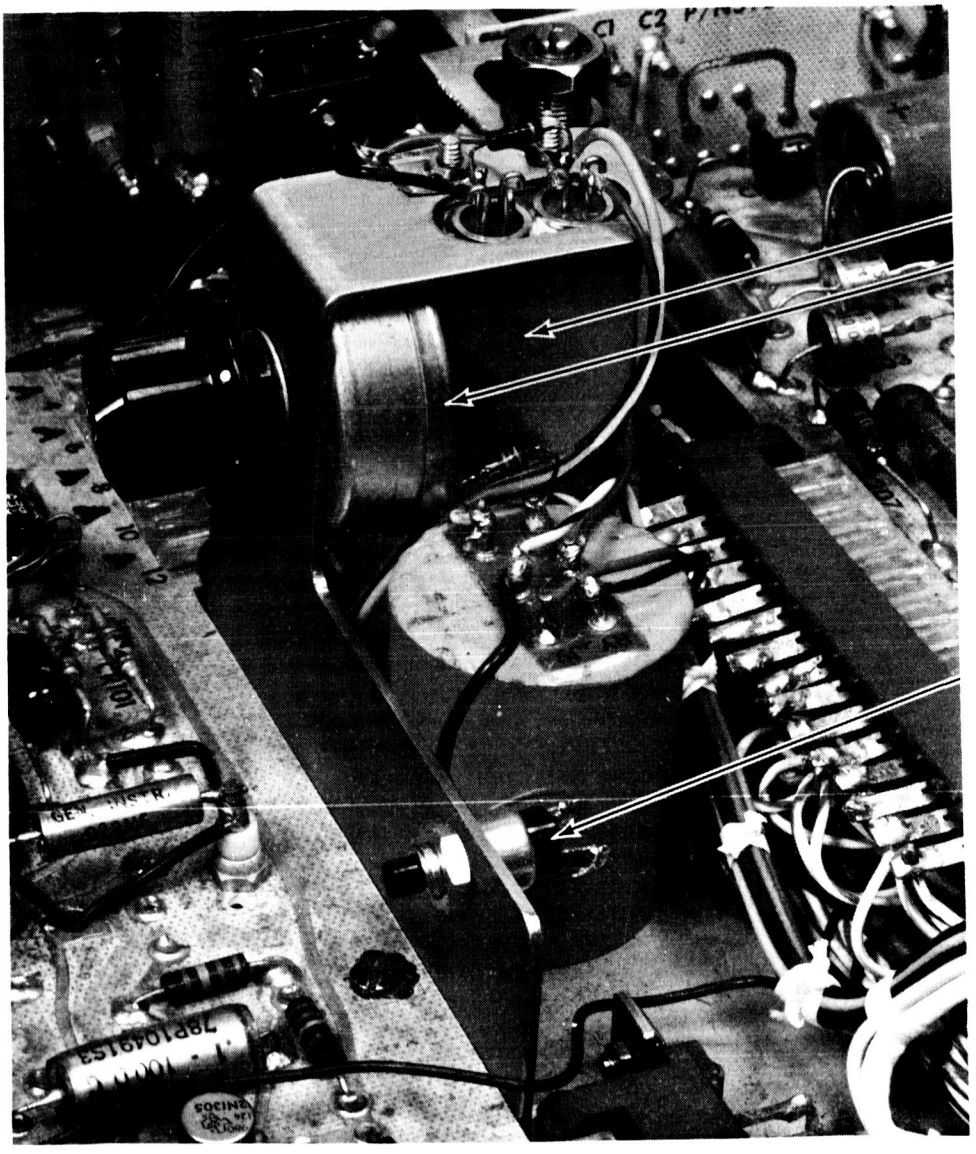

Figure 1. Marking Current Bracket Modification and Installation

5. Using the hardware which was removed in step 3, mount the assembly into the drawer as shown on Figure 1.

6. Remove the mounting hardware from connector J1101 (at rear of chassis) and the connector mounting bracket. (This hardware will be used later.)

7. Assemble bracket (item 2) and connector J1101 to the bracket removed in step 6. Use items 9, 10. and 11.

8. Assemble connector J1110 to bracket (item 2) and dress harness assembly as shown in RCA Dwgs. 1843736 and 1848261.

9. Secure the connector bracket assembly as shown, using the nuts and washers which were previously used and the new 8-32 screws (item 4). Figure 2 shows a completed installation of jack J1110.

10. Connect the harness wires as specified on RCA Dwgs. 1843736 and 1848261.

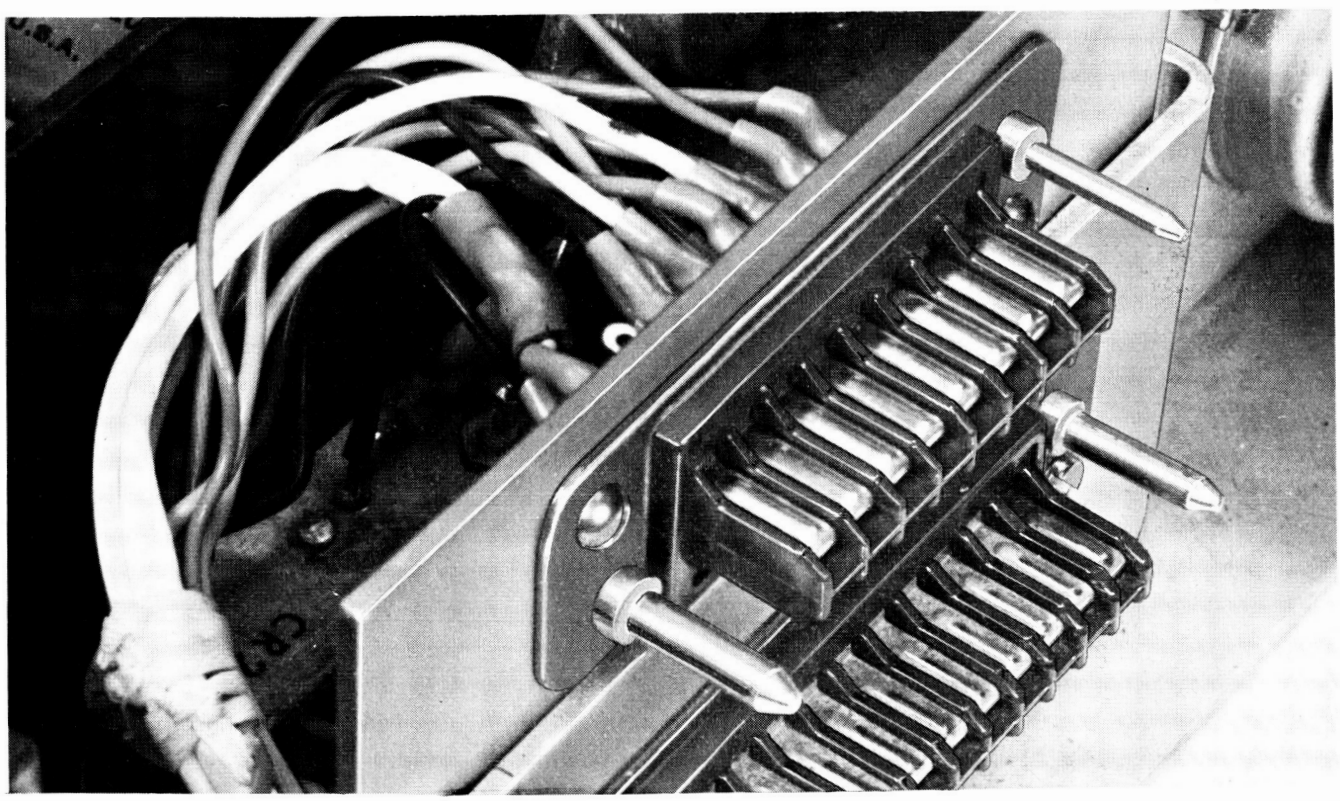

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Figure 2. Jack J1110, Installation

D. MODIFICATION PROCEDURE FOR RECORDER CHASSIS

1. Remove the two screws (item A) which retain the receptacle mounting plate (item B), shown in Figure 3.
2. Carefully ease the mounting plate away from the housing. (Movement is restricted by wiring.)
3. Disconnect the wires terminating at connector 1A6J1. Label each with its pin number as it is disconnected.
4. Remove connector 1A6J1 from mounting plate.

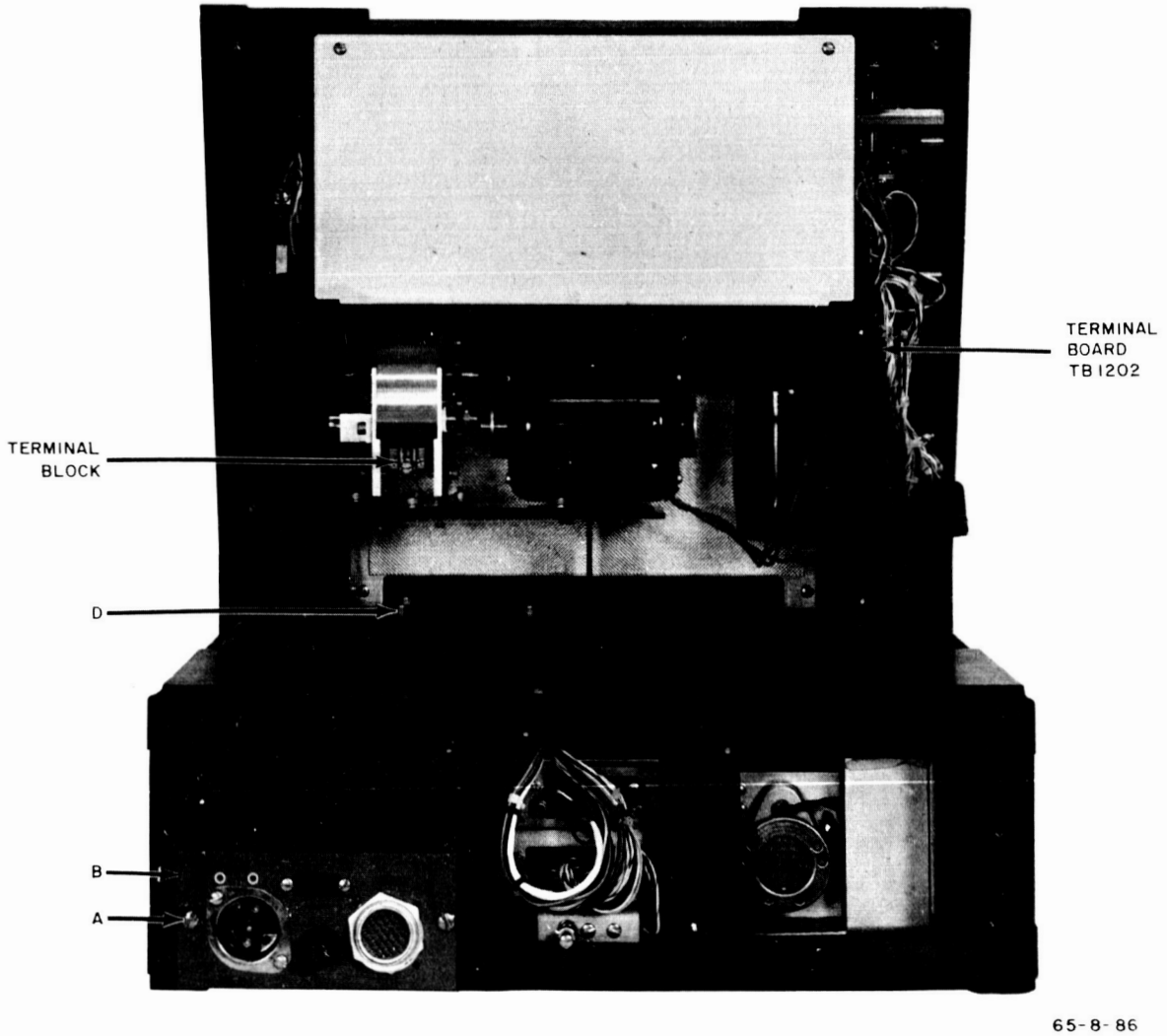


Figure 3. Motor and Gear Train Assembly, and Connector 1A6J1

5. Dress the chassis harness shown on RCA Dwg. 1848265 and install as shown in Figure 4 using four cable clamps (item 4) to replace those previously installed.

6. Remove two screws and lockwashers (item C) that retain bracket (item D). Mount connector P1110 to bracket (item 17) as shown.

7. Loosely mount the assembled bracket over bracket (item C) and adjust P1101 and P1110 so that they align with the drawer connectors J1101 and J1110. Tighten the screws.

8. Connect the wires removed in step 3 to pins of connector DM-9601-37P (1A6J1) in accordance with Table 2.

9. Assemble connector 1A6J1 to bracket (item B Figure 3).

10. Fasten bracket (item B) to housing by means of screws (item A Figure 3).

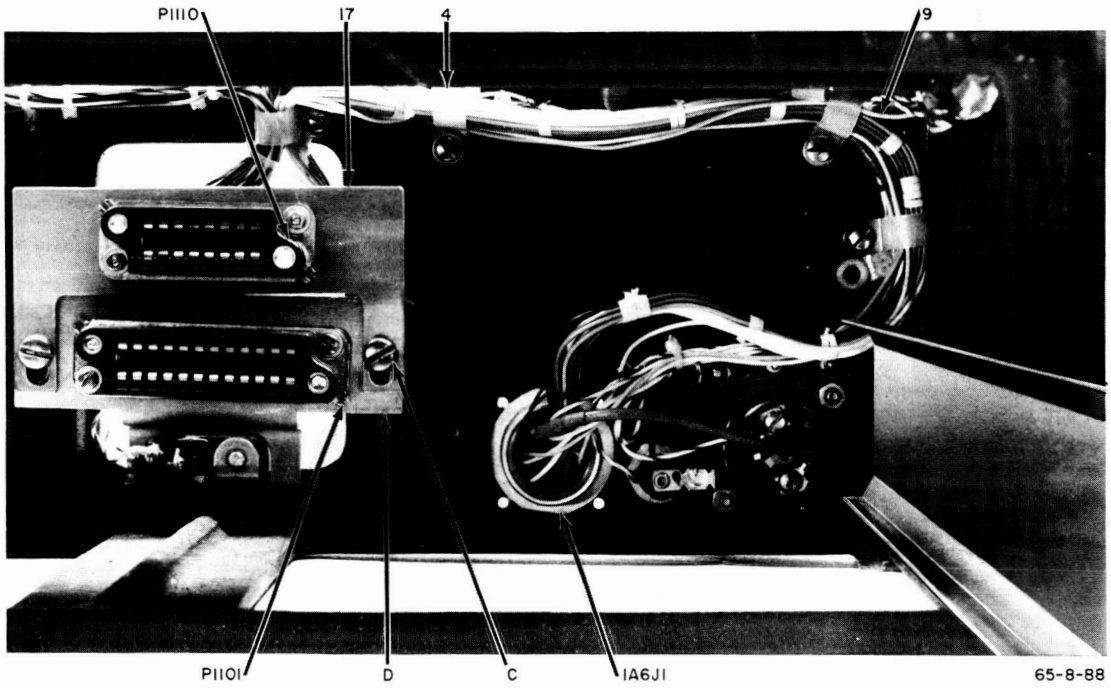


Figure 4. Recorder Intraconnecting Harness Installation

TABLE 2. CONNECTOR 1A6J1 PIN CONVERSION

Old Pin designations	New Pin designations
M	37
K	20
A	21
B	23
C	24
D	25
E	26

E. MOTOR AND GEAR TRAIN ASSEMBLY INSTALLATION

1. Disconnect the three motor leads from the terminal board on the right-hand side of the Recorder (as viewed from the rear, See Figure 3).
2. Remove four screws (item D) and remove the drive motor and bracket.
3. Place the motor and gear train assembly, with its bracket, in the position from which the drive motor was removed.
4. Secure the bracket loosely with the four screws (item D).
5. Adjust the assembly to obtain proper mesh between the metal drive gear and the fiber driven gear.
6. Dress wire 9 (See RCA Dwg. 1848265) through the lightening hole on the left side of the recorder (as viewed from the rear).

7. Connect the free end of wire 9 to the terminal block on the gear-train housing.

8. Connect the motor leads to the terminal block on the right-hand side of the Recorder as follows:

Terminal No.	Lead Color
1	Black
2	Blue
3	Black and Blue (double wire)

F. HRIR CONVERTER INSTALLATION

The HRIR Converter has a standard 19-inch front panel. See Figure 5. Mount the HRIR Converter as near the facsimile recorder as possible to ensure that the interconnecting cable 1W14 shown on RCA Dwg. 1848271 can be installed.

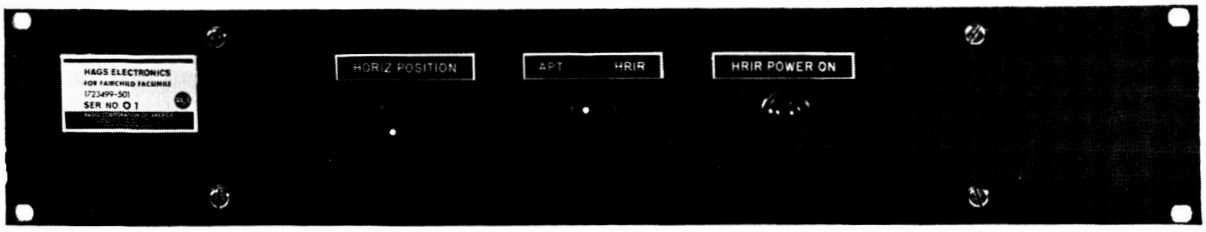


Figure 5. HRIR Converter Assembly

SECTION III

THEORY OF OPERATION

A. GENERAL

Modifications are required because the signal content of the HRIR signal and the APTS signal differs significantly. The APTS signal provides one framed picture every 208 seconds. The first 8 seconds contains a start tone and phasing pulses; the last 200 seconds contains 800 lines of video at 4 lines per second (240 lines per minute). The start tone and phasing pulses signals are used to start the facsimile recorder, provide a reference signal for AGC, and frame (center) the picture on the printout. The HRIR system takes one-unframed (continuous) picture during night-time operation and provides a signal that contains seven marker pulses and video. There is no start tone or phasing pulses and the line rate is 44.715--lines per minute (48 lines per minute for later Nimbus spacecrafts).

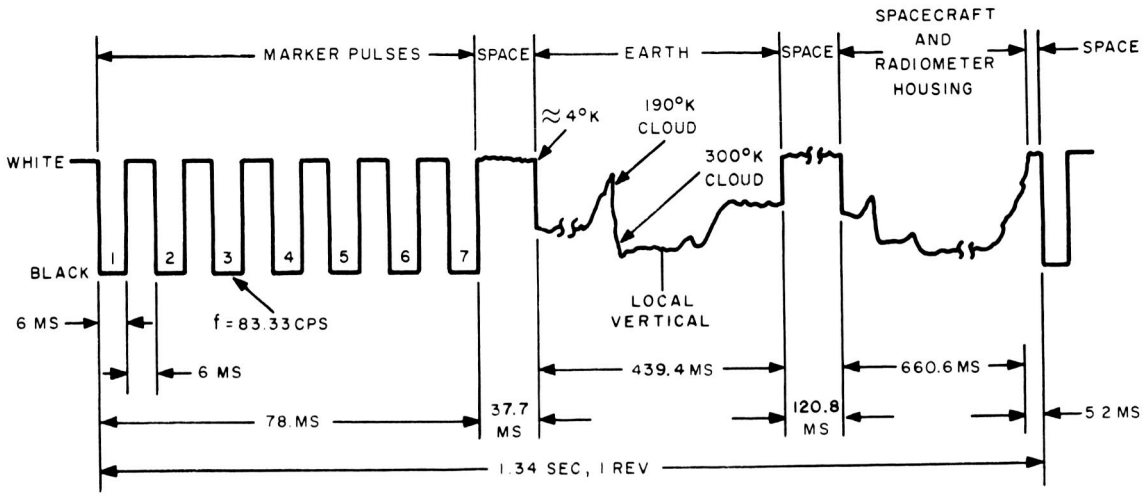
The present facsimile recorder is utilized by installing a gear train and clutch assembly that provides two speeds of operation, one for APTS printouts and one for HRIR printouts. When the facsimile-recorder speed is reduced for HRIR printouts, the writing current must be reduced, otherwise the printout would burn when black-level signals are received.

Finally, the facsimile recorder must be controlled. Control is initiated automatically as in the APTS mode with the HRIR converter shown in Figure 5. This unit contains circuits that detect the marker pulses (See Figure 6) and generate the necessary start, phasing, and AGC signals. Requirements for both the manual and automatic modes of operation are presented separately.

B. FACSIMILE PRINTOUTS, MANUAL MODE

Modifications required for the manual mode of operation consist of the gear train and clutch assembly shown in Figure 7 and a control that changes the writing current and selects the proper operating speed. The gear ratio required for HRIR printouts must reduce the facsimile-recorder speed so that it equals the radiometer speed. The radiometer speed in the Nimbus C spacecraft is 5500/123 rpm. To obtain this speed, the gear ratio must reduce the facsimile recorder speed by the following ratio,

$$\frac{5500/123}{240}$$



NOTE: THE DURATION OF EARTH AND SPACE SCAN VARIES WITH ALTITUDE. THE VALUES OF TIME SHOWN ARE TYPICAL FOR AN ALTITUDE 0600 NAUTICAL MILES

Figure 6. Composite HRIR-Video Signal

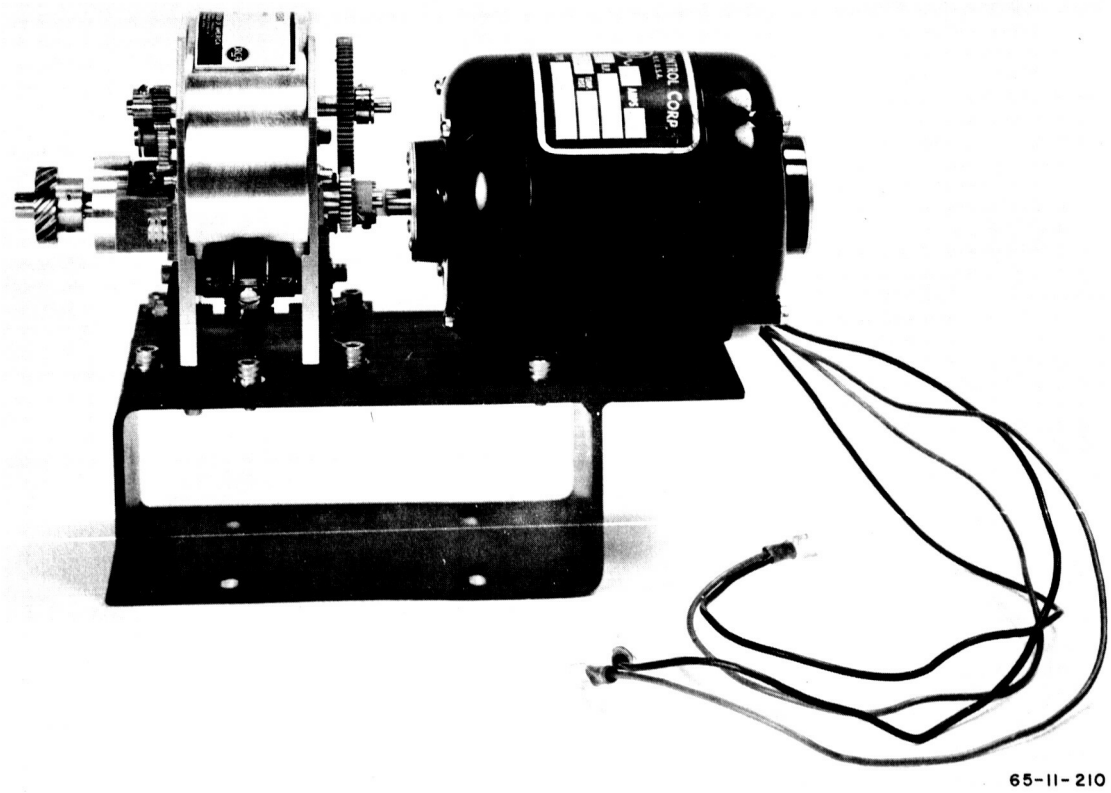


Figure 7. Gear Train and Clutch Assembly

Future Nimbus spacecraft may use a radiometer speed of 48 rpm; in this case the gear ratio must reduce the facsimile recorder speed by 0.2.

Since the helix rotates at approximately one-fifth the APTS rate, the marking current must be reduced to prevent burning of the facsimile paper when black-signal levels are received. Marking current for HRIR operation should be 58 ± 1.5 milliamperes compared to 170 ± 5.0 milliamperes for APTS operation. The marking current is controlled by connecting a dropping resistor in parallel with the normally closed contacts of a relay. The parallel combination is connected into the marking circuits so that the dropping resistor is bypassed during APTS operation. During HRIR operation, the relay contacts are opened and the dropping resistor is switched into the marking circuit, thereby reducing the writing current. The clutch, also energized during HRIR operation, is energized by the same control as the relay. Control of the facsimile recorder (starting, phasing, and automatic gain control) is performed manually as described in the "Automatic Picture Transmission Ground Station, Installation, Operation, and Maintenance Manual," issued by Fairchild Stratos on March 15, 1963.

C. FACSIMILE PRINTOUT, AUTOMATIC MODE

Modifications for the automatic mode of operation consists of the Gear Train and Clutch Assembly shown in Figure 7 and the HRIR Converter shown in Figure 5. The Gear Train and Clutch Assembly is identical with the unit described for the manual mode of operation. Control of the facsimile recorder is a function of the HRIR converter which detects the HRIR signal and generates the necessary control signals.

During the APTS operation, the 300-cps start tone is used to start the facsimile recorder. The HRIR signal does not contain a 300-cps start tone, therefore; another means of starting the facsimile recorder must be used. The presence of the marker pulses may be used to simulate the start tone if a detector with good discrimination is used. When the start function is complete, phasing and AGC can be performed.

The phasing and AGC functions of the facsimile recorder are dependent on phasing pulses contained in the APTS signal. Since the HRIR signal does not contain phasing pulses, another method of providing this function is required. For automatic phasing, the marker pulses are detected, shaped to simulate APTS phasing pulses, and injected into the facsimile-recorder circuits. The facsimile-recorder circuits compare the phasing pulses with the signal received from a cam-operated switch on the helix shaft. When the pulses coincide, the speed of the helix shaft (reduced during the phasing cycle) is returned to normal. At this time the video is correctly phased (centered on the printout) and the phasing cycle is terminated.

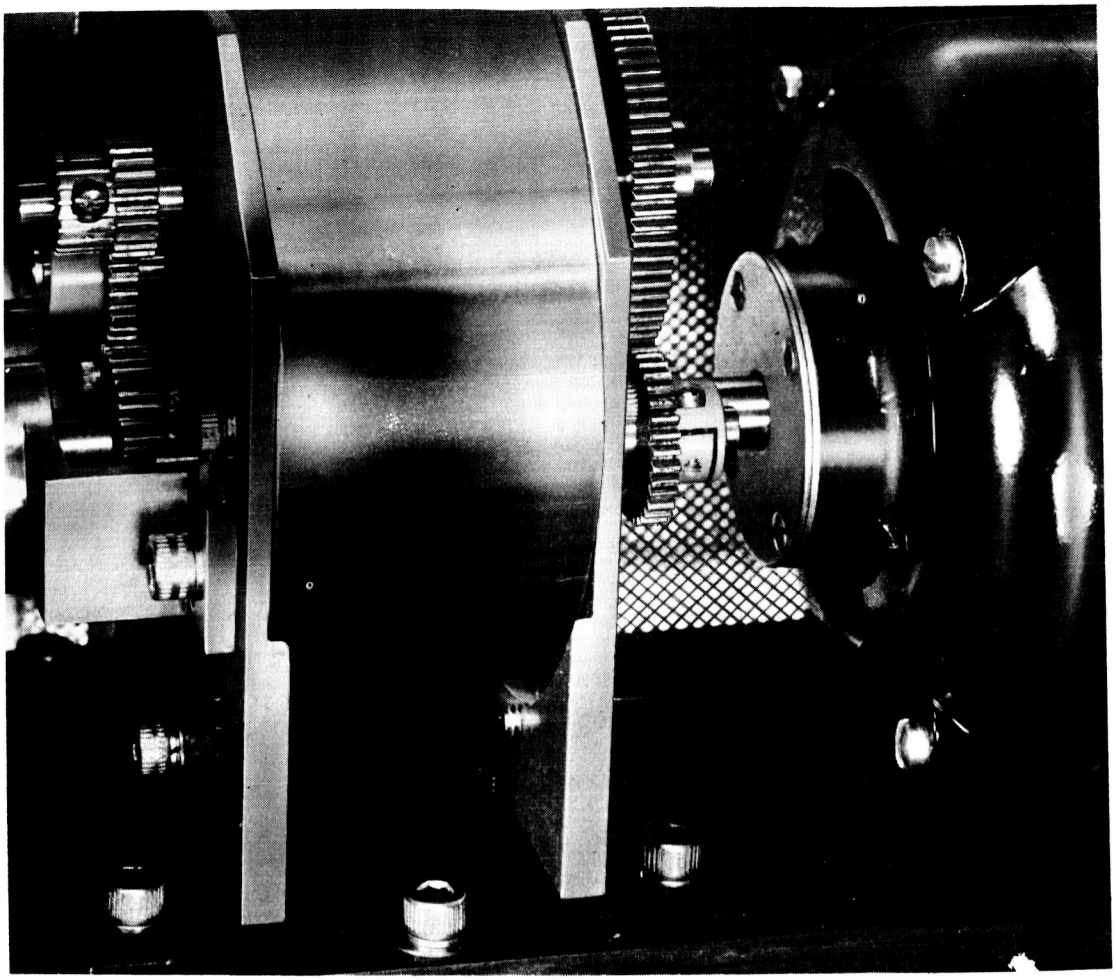


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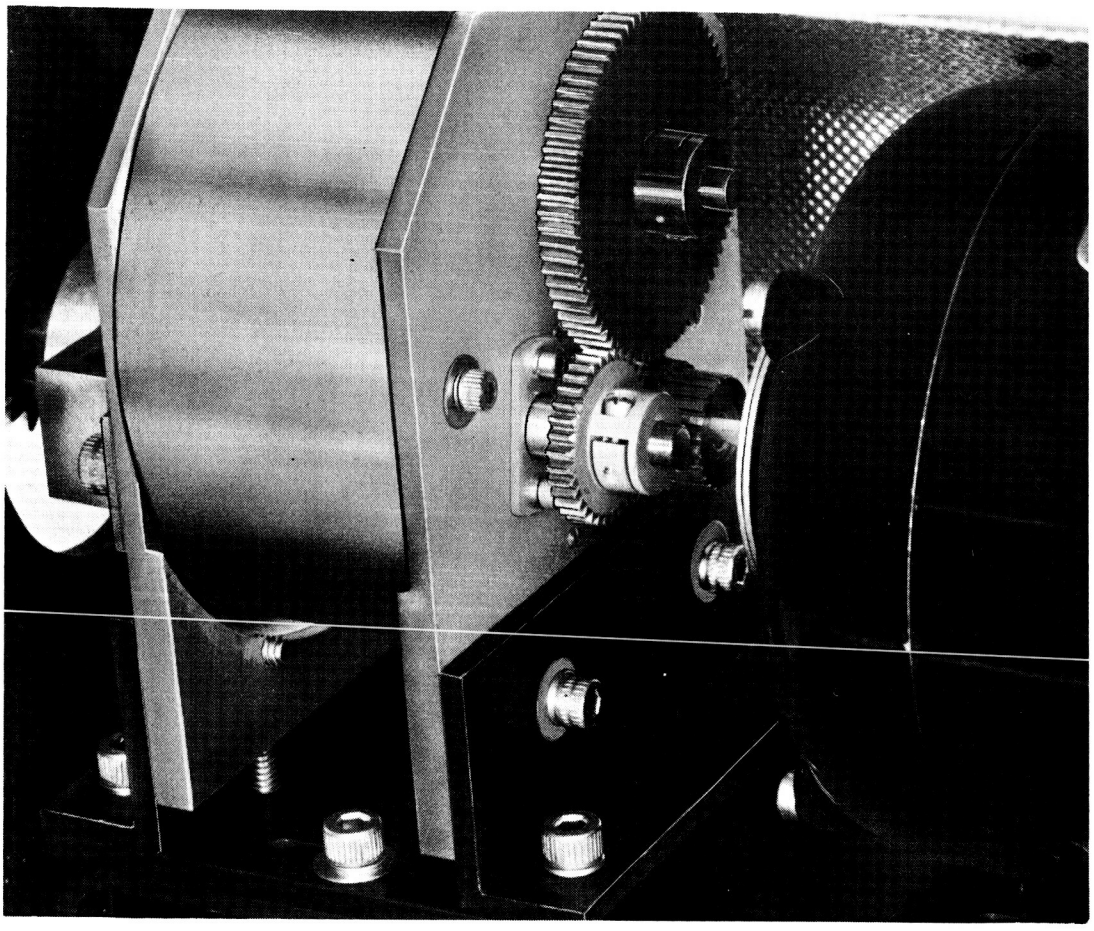
Figure 8. Gear Train Drive, Left Side

Automatic gain, provided by a motor-driven potentiometer and comparator, is dependent on the white level of the phasing pulses during APTS operation. During HRIR operation, a white level signal (space-white) suitable for AGC control is available after each earth scan (see Figure 6). To ensure that AGC occurs during the space-white interval, the marker pulses are detected and used to generate a sample signal. The sample signal, delayed 560 milliseconds from the beginning of the marker pulses, enables the AGC circuits when the space-white signal is present. During the remainder of each line, the AGC circuits are disabled.

D. DETAILED THEORY OF OPERATION

1. Gear Train and Clutch Assembly

A detailed view of the right- and left-hand side of the gear train and clutch assembly is shown in Figures 8 and 9. Details of the installation and motor drive are also shown. The gear train provides the two speeds required

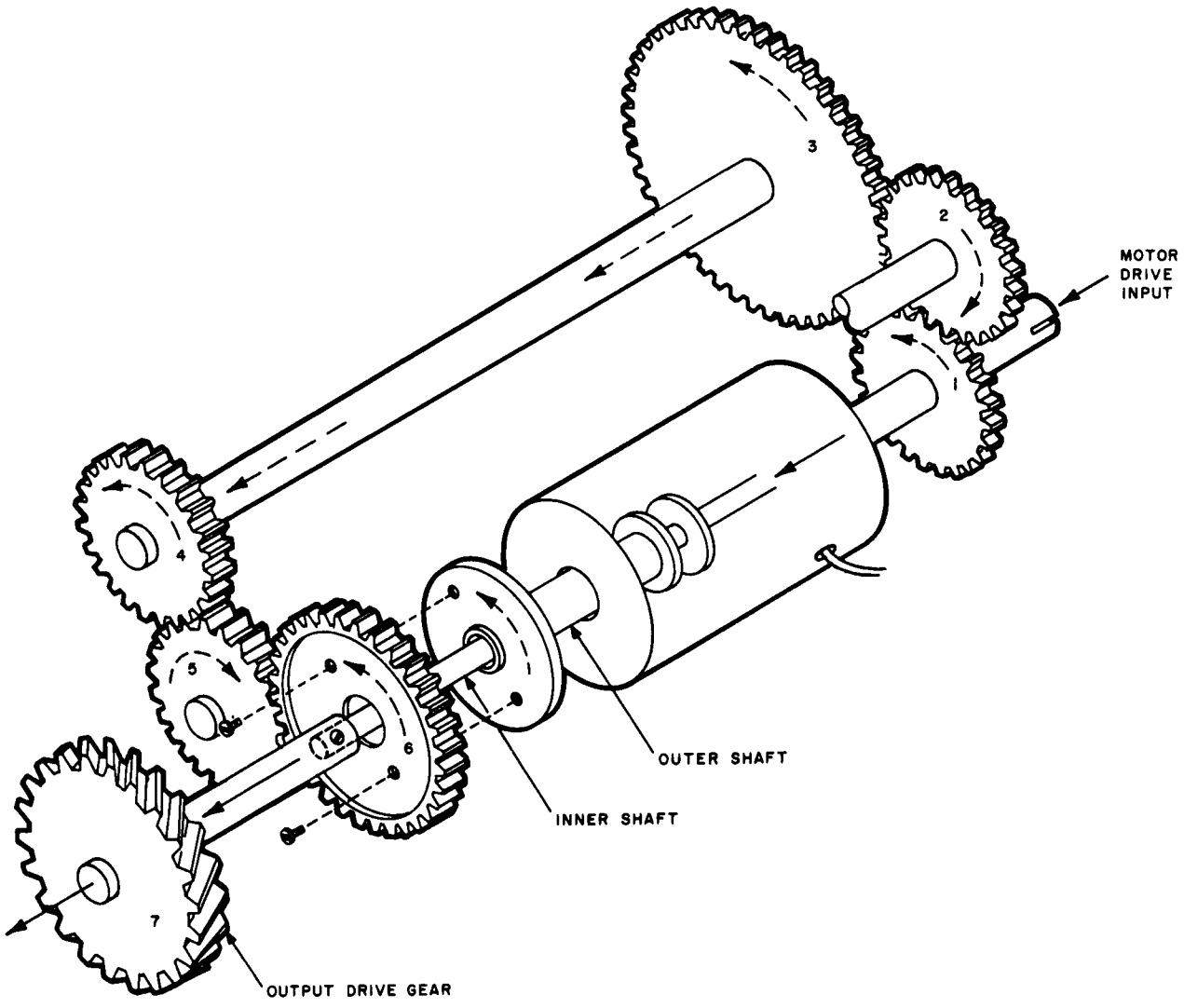


65-8-37

Figure 9. Gear Train Drive, Right Side

to produce APTS or HRIR signals on the facsimile recorder. The clutch provides the means of selecting either speed by means of control switch. During APTS operation, the clutch is deenergized and the input-output ratio is 1 to 1. Power is then transferred through the clutch, the inner shaft, and gear No. 7 (see the solid arrows in Figure 10). When the clutch is deenergized, the outer shaft is floating (no power transfer). During HRIR operation the clutch is energized and power is then transferred through gear Nos. 1 through 6, the outer shaft, the inner shaft, and gear No. 7 (see the dashed lines in Figure 10). When the clutch is energized, the motor-drive input shaft is disconnected (floating) and the outer shaft is locked to the inner shaft. The exact input-output ratio must be equal to the APTS/HRIR line ratio, namely:

$$\frac{\text{APTS rate}}{\text{HRIR rate}} = \frac{240}{5500/123} \quad (5.0 \text{ for later spacecraft}).$$



GEAR NUMBER	1	2	3	4	5	6	7
NUMBER OF TEETH	25	34	72	22	34	41	16

——► APTS DRIVE-RATIO = 1:1
— — ► HRIR DRIVE-RATIO = 1:267/1476

Figure 10. Gear Train Schematic

The number of teeth in gears 1, 3, 4, and 6 are selected until

$$\frac{N_6}{N_4} \times \frac{N_3}{N_1} = \frac{41}{22} \times \frac{72}{25} = \frac{2952}{550} = 5.3672\text{----}$$

where N is the number of teeth.

It does not matter how many teeth are on the idler gears, Nos. 2 and 5, as they cancel out when the gear ratios are computed. The assembly drawing of the gear train and clutch assembly is shown in RCA Dwg. 1723737.

2. Marking Current and Clutch Control

During the HRIR mode of operation it is necessary to reduce the marking current to 58 ± 1.5 milliamperes and to energize the clutch. The marking current is reduced by placing a 4-watt potentiometer (R503) between resistors R118 and R128 in the facsimile recorder as shown in Figure 11. The use of a linear potentiometer provides a convenient method of making periodic adjustments.

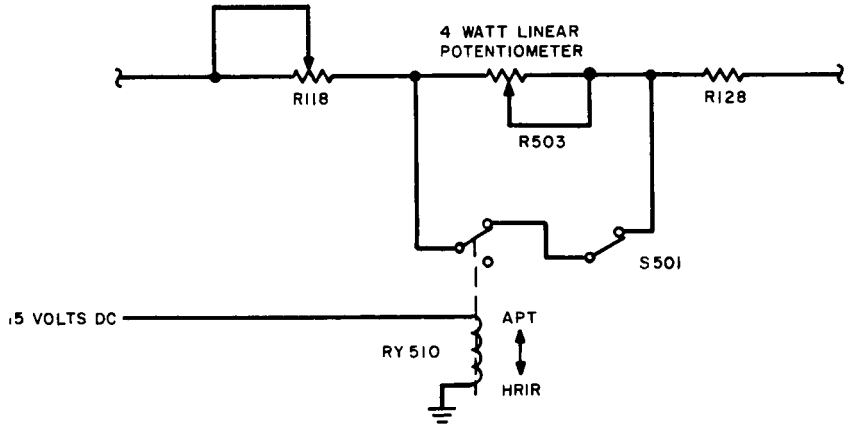


Figure 11. Marking Current and Clutch Control Circuit

When relay RY510 is energized, the contacts open and potentiometer R503 is then in series between R118 or R128. A normally closed, push-button switch (S501), in series with the contacts of relay RY510, provides a means of adjusting the writing current without energizing the relay.

3. Drawer Harness

The drawer harness provides the means of connecting the new circuits of the HRIR converter to the existing circuits in the facsimile drawer. It consists of a 14-wire harness connected to jack J1110. Jack J1110, shown in Figure 2, mates with plug P1110 on the chassis when the drawer is closed. Electrical connections are shown in Figure 12 where small portions of the existing schematic (Figure 6-31 in the existing ground station manual) are reproduced.

4. Chassis Harness

The chassis harness provides circuit continuity between the facsimile-recorder electronic drawer and the facsimile-recorder chassis. Electrical connections for the chassis harness are shown in Figure 12. A typical installation is shown in Figure 4.

5. Adapter Harness, 1W14

The adapter harness provides circuit continuity between the facsimile recorder, the facsimile test set, and the HRIR converter. Electrical connections for the wires between the HRIR converter and the facsimile recorder are shown in Figure 12. Connections between the facsimile test set and the facsimile recorder have not been changed. Outline and assembly information is shown in RCA Dwg. 1848271.

6. Extender Cable, 1W13

The extender cable is used to connect the facsimile-recorder drawer to the chassis when the drawer is removed for troubleshooting. When used, the extender cable is connected between jack J1110 on the drawer and plug P1110 on the chassis. A complementary cable, furnished as part of the ground station, is connected to jack J1101. Outline and assembly information for the extender cable is shown in RCA Dwg. 1848252.

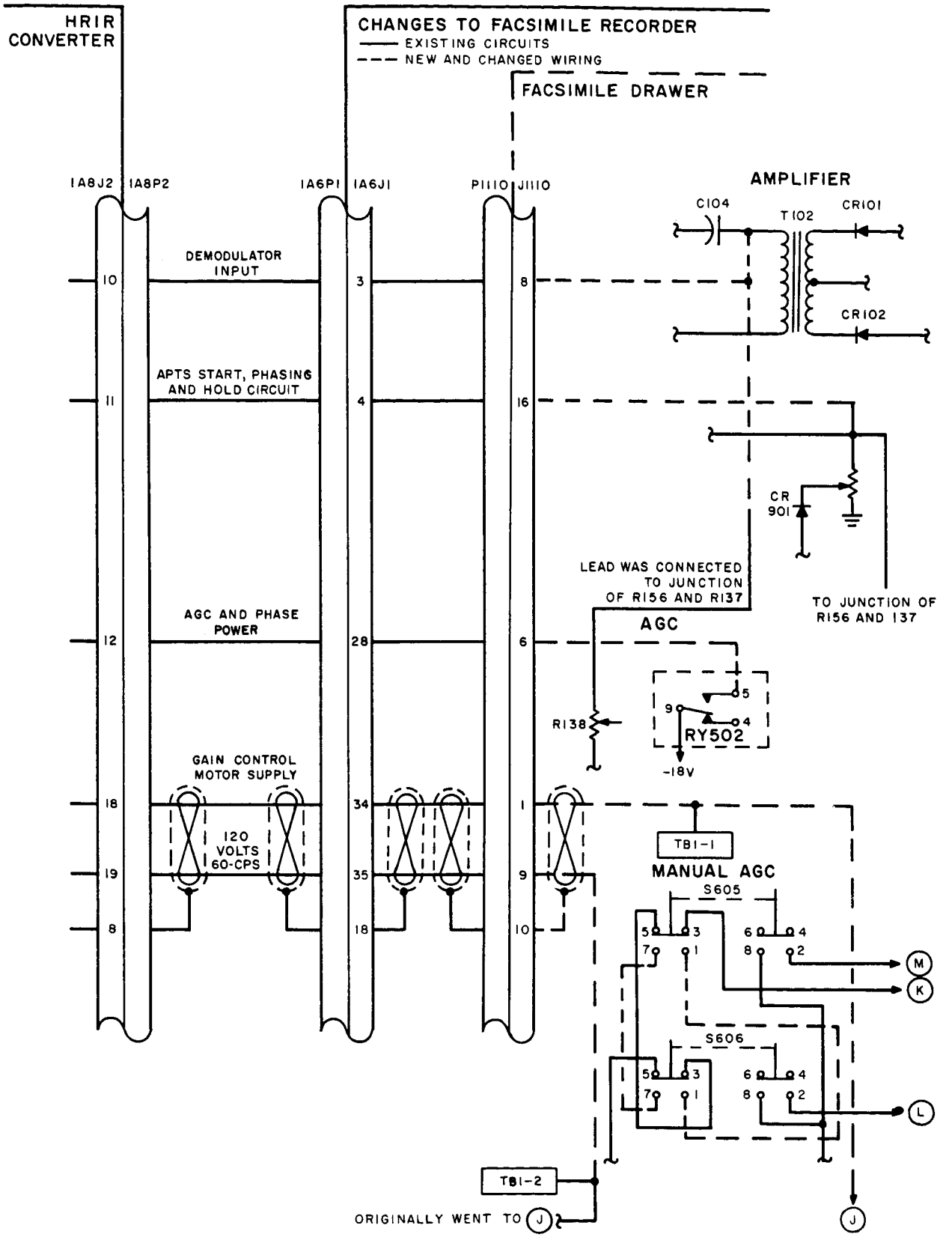


Figure 12. Circuit Modifications for Facsimile Drawer (Sheet 1 of 3)

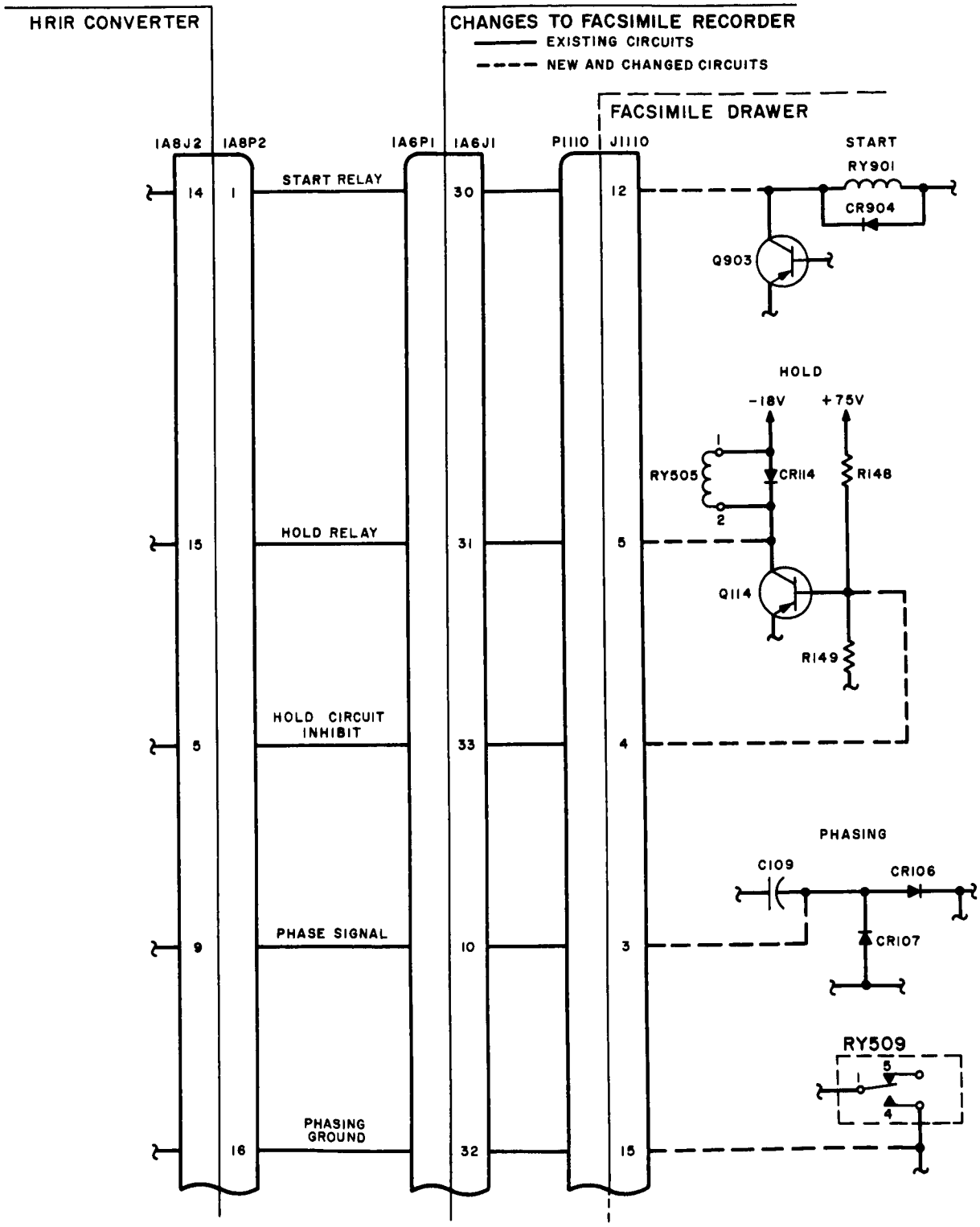


Figure 12. Circuit Modifications for Facsimile Drawer (Sheet 2 of 3)

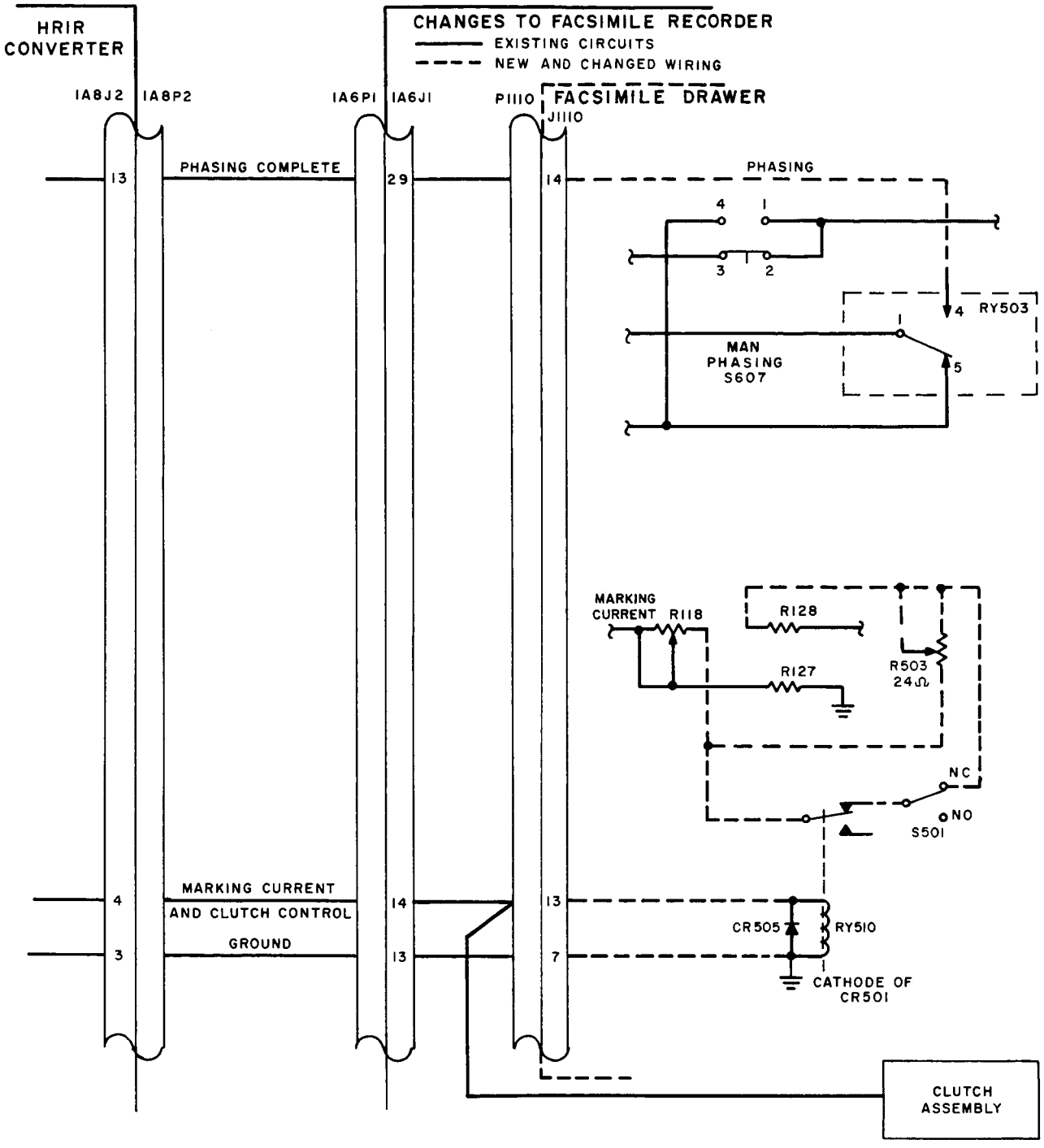


Figure 12. Circuit Modifications for Facsimile Drawer (Sheet 3 of 3)

7. HRIR Converter

a. GENERAL

The HRIR converter detects the marker pulses from the HRIR signal and generates the control signals necessary for the automatic mode of operation. It consists of a self-contained power supply and electronic circuits as shown in Figure 13. A complete chassis schematic is shown in RCA Dwg. 1723763.

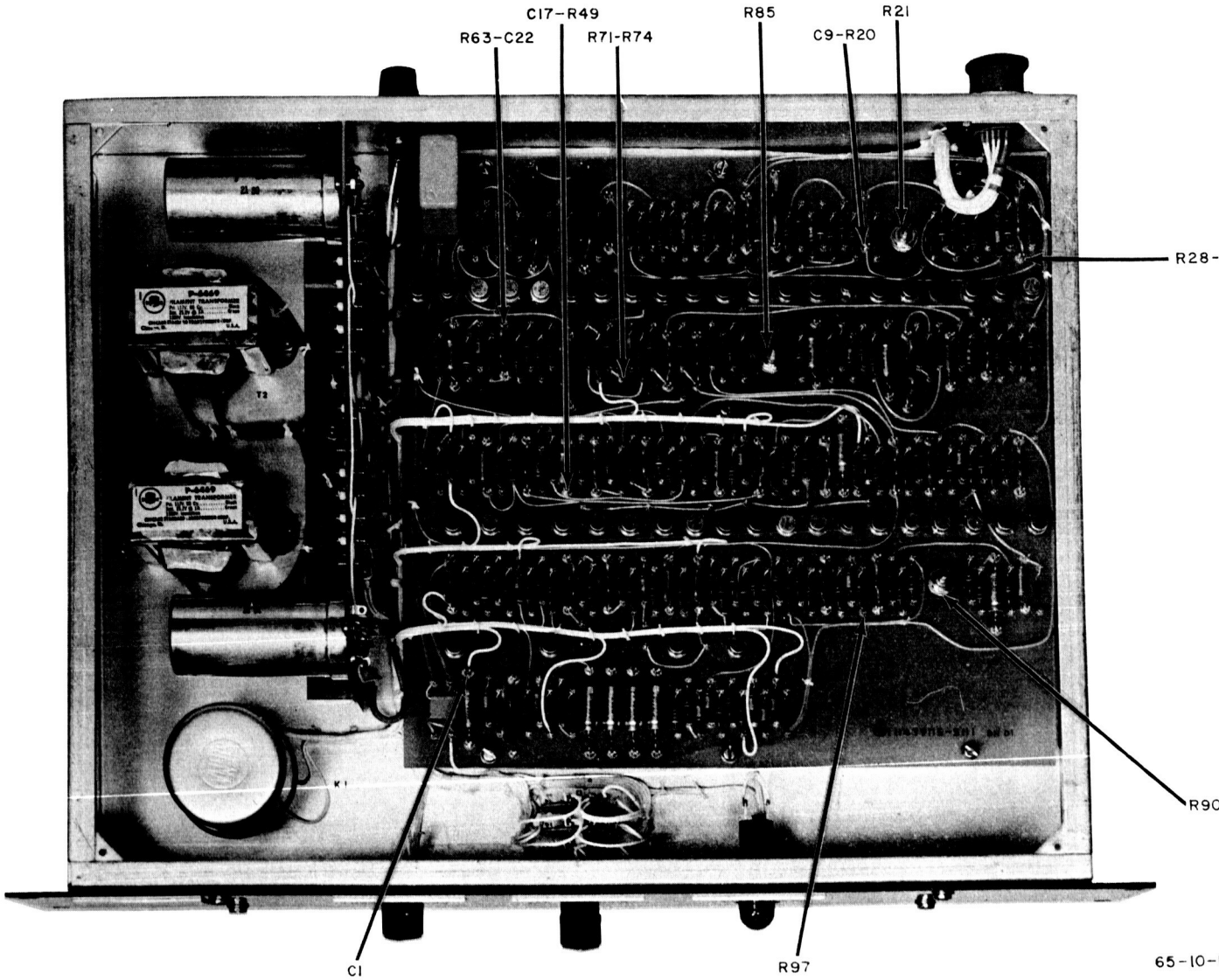


Figure 13. HRIR Converter, Internal View

During APTS operation, two control signals are detected and used to perform these functions; one is a 300-cps start tone that lasts for 3 seconds; the second is a series of phasing pulses that last for 5 seconds and occurs at the APTS line rate (4 pps). These signals are responsible for starting and executing the phasing cycle (centering) and providing a reference period during which a motor driven servo adjusts the gain of the facsimile recorder circuits.

During HRIR operation, the control signals are generated by the HRIR Converter and supplied to the facsimile recorder. A block diagram in Figure 14 shows the relationship of the HRIR Converter and the facsimile recorder. A Nimbus C timing chart in Figure 15 is used to supplement the block diagram and the functional description. When the selector switch is set to APT, power is removed from the HRIR converter circuits to eliminate the possibility of circuit interference during the APTS mode of operation. When the selector switch is set to the HRIR position, power is applied to the HRIR converter and the 2400-cps subcarrier is applied to the existing amplitude detector in the facsimile recorder. The analog-signal output of the detector is supplied to the marking circuits where it is used to modulate the writing current. Simultaneously, the 2400-cps subcarrier is applied to the HRIR converter when an identical analog signal is derived from an amplitude detector. The second analog output is then applied to the horizontal sync detector where five of the marker pulses are detected and shaped into a horizontal sync pulse (waveform F on timing chart). The detection of 5 marker pulses reduces the possibility of triggering the control circuits with random noise signals. The sync pulse is applied to the shift generator where two signals are formed. One output signal inhibits the operation of the horizontal sync detector until the earth scan is completed. This ensures that the video does not trigger the sync circuits. The second output is delayed 530 milliseconds (waveform G on timing chart) to ensure that the start cycle (hold, phasing, and sample generators) is triggered during the space-scan period (120. 8 milliseconds) following the earth scan.

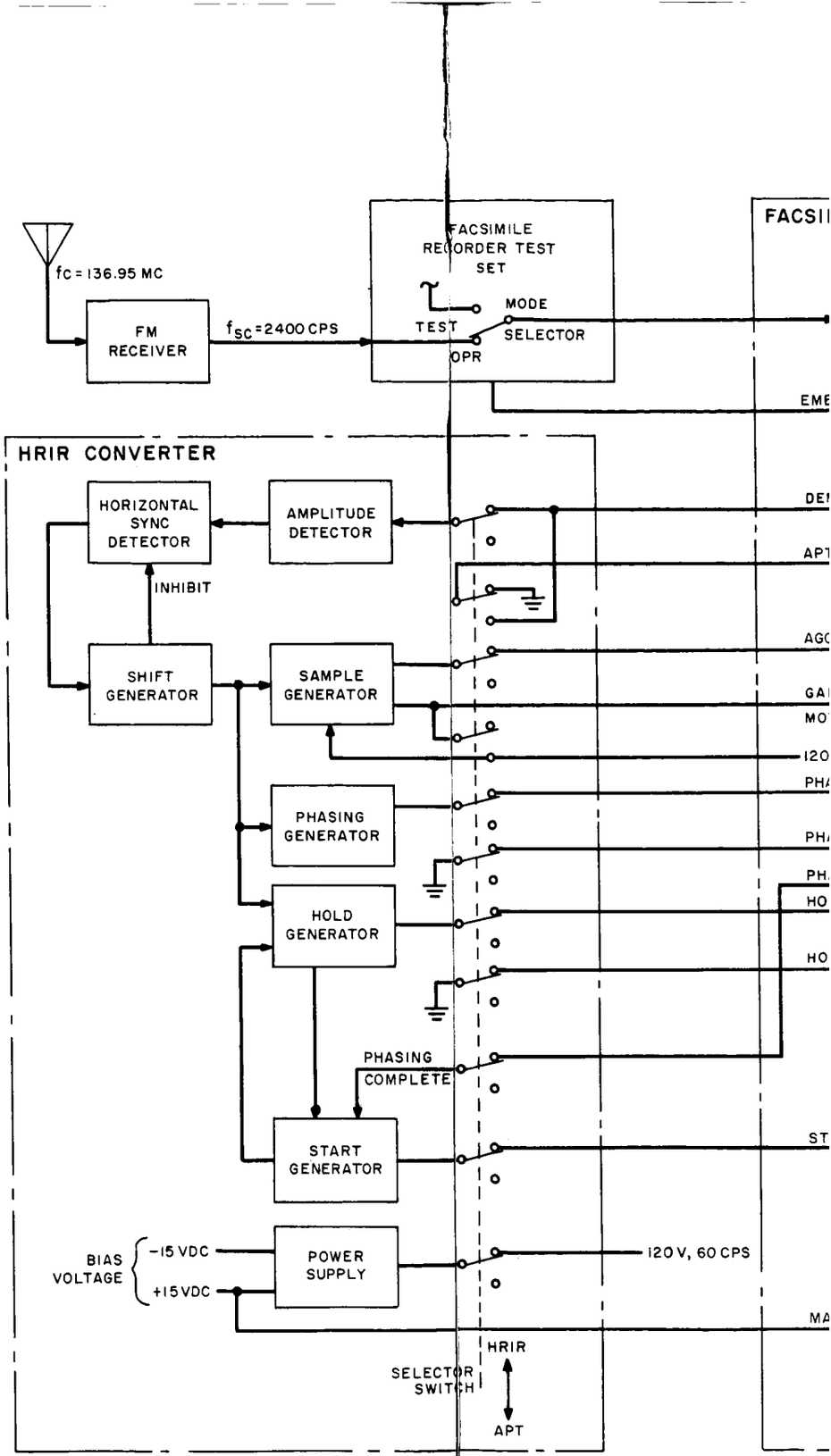
The hold generator insures operation of the facsimile recorder until the loss of sync exceeds 8 seconds. The output of the shift generator, 530 ± 20 milliseconds long, energizes a relay driver via an OR gate. When the voltage from the shift generator ends (end of the earth scan) a one-shot is triggered. The output of the one-shot provides a signal to the OR gate until a new sync pulse is detected. Thus, a continuous voltage is supplied to the relay driver as long as sync pulses are present. Operation of the relay driver energizes relay RY505 in the facsimile recorder and power is applied to the writing circuits, AGC circuits, and the drive-motor circuits. Simultaneously, a second output of the hold generator (waveform K on timing chart) triggers the start generator that energizes RY901 in the facsimile recorder. Thus, the output of the start generator performs the function performed by the detected 300-cps start tone of the APTS signal.

Relay RY901 energizes an 8-second timer that enables the phasing and AGC circuits. During the 8 seconds established by the timer, phasing and AGC must be completed. If horizontal sync is lost before phasing is complete, the hold generator is disabled until the next sync pulse is detected. When sync is detected, phasing and AGC continues. If the remainder of an 8-second cycle is too short to complete phasing, a second 8-second cycle is started. When phasing is complete, a signal from the facsimile recorder resets the start generator, relay RY901 is deenergized, and operation of the facsimile recorder continues until the HRIR signal is lost. If sync is lost temporarily (less than 7.5 seconds) after phasing is complete, a signal from the start generator drives the hold generator for an additional 8 seconds. This arrangement prevents the start of a new phasing cycle and video dropout if loss of sync is temporary. When sync is lost for more than 8 seconds, the hold circuit is deenergized and the facsimile recorder stops. Recovery of sync, after an 8-second dropout, initiates a new start cycle.

Phasing must occur during the 8-second interval established by the start generator. The phasing generator receives the shift generator output and generates simulated phasing pulses for the facsimile recorder (waveform R on timing chart). The position of these pulses, controlled by adjusting the HORIZ POSITION control on the HRIR converter, allows the earth readout to be locked-in at various horizontal positions on the facsimile printout. In the facsimile recorder, the phasing pulses are compared to a signal generated by the cam-operated contacts on the helix shaft. When the two signals are in phase, the speed of the helix returns to normal and the phasing-complete signal is returned to the start generator. The presence of the phasing-complete signal ends the start cycle.

Automatic gain control must be completed during the phasing cycle. When the start generator enables the AGC and phasing circuits for 8 seconds, minus 18 volts dc (AGC and phase power) is applied to the sample generator in the HRIR converter. Simultaneously, the 80-millisecond sample signal (waveform S on timing chart) is generated. These signals energize a sample relay which supplies 120 volts, 60 cps to the AGC motors in the facsimile recorder. When phasing is complete, minus 18 volts is removed from the sample generator and the relay driver is disabled. Limiting relay operation to the phasing cycle is designed to prolong relay life.

A detailed electrical description is provided for the circuits contained in the HRIR converter. The description is supplemented with a block diagram shown in Figure 16 and the timing chart on Figure 15.


fc = 136.95 MC
FM RECEIVER
f_{SC} = 2400 CPS
FACSIMILE RECORDER TEST SET
MODE SELECTOR
TEST
OPR
FACSI
EME
HRIR CONVERTER
HORIZONTAL SYNC DETECTOR
AMPLITUDE DETECTOR
INHIBIT
SHIFT GENERATOR
SAMPLE GENERATOR
PHASING GENERATOR
HOLD GENERATOR
PHASING COMPLETE
START GENERATOR
BIAS VOLTAGE
-15 VDC
+15 VDC
POWER SUPPLY
120 V, 60 CPS
HRIR
SELECTOR SWITCH
APT
DE
APT
AGC
GA
MO
120
PHA
PHA
PH
HO
HO
ST
MA

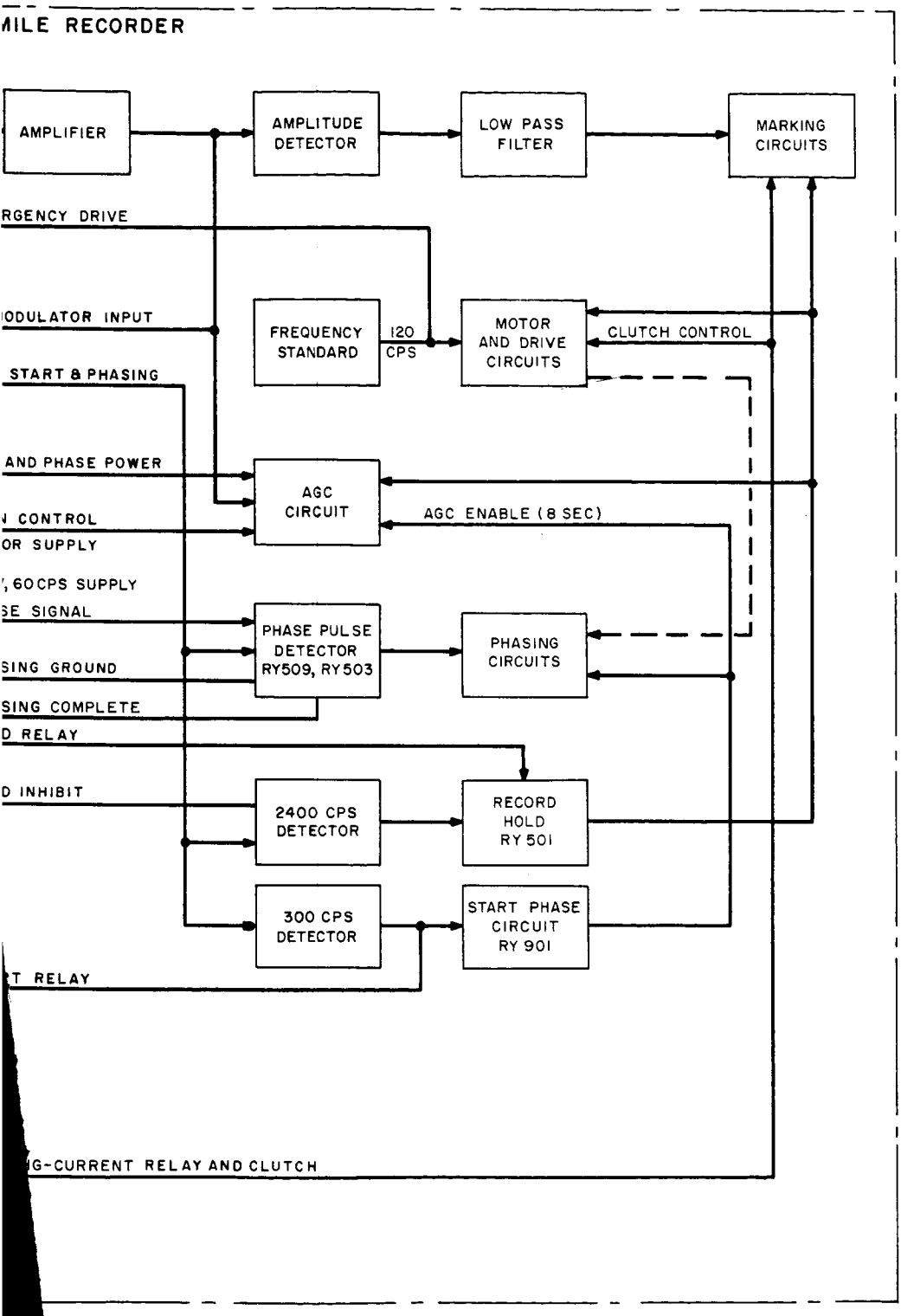


Figure 14. HRIR Converter Functional Block Diagram

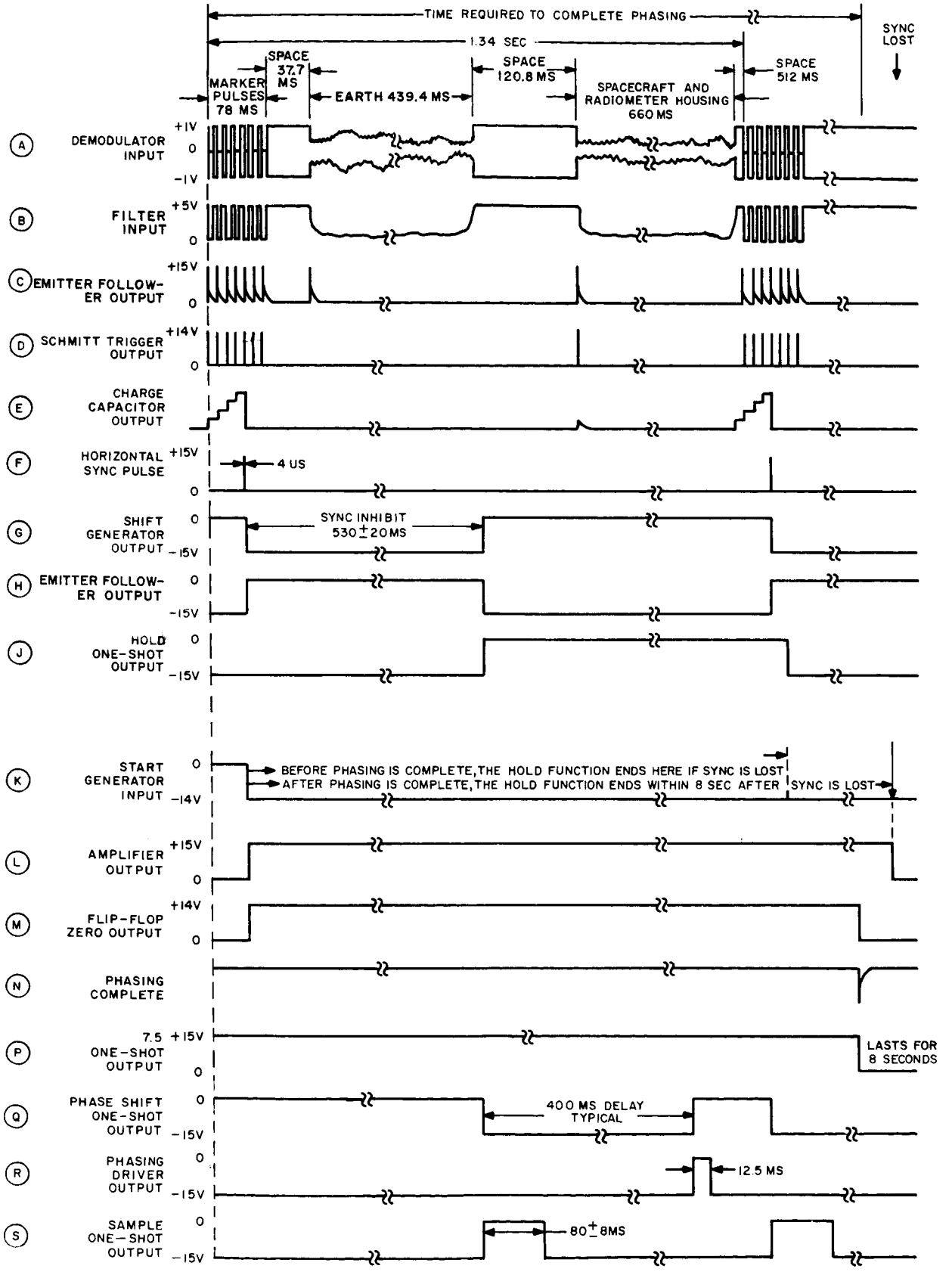


Figure 15. HRIR Converter Timing Chart

b. DEMODULATOR

The amplified-subcarrier input from the facsimile recorder is applied to the demodulator where the signal is detected and amplified. The demodulated signal is applied to a low-pass filter (L1, C2, C3) and then to a high-frequency compensating network (C4, R3). The filter attenuates the video frequencies (300 cps maximum) and passes the higher frequency marker pulses (1600 cps). The marker pulses (waveform B) are amplified, differentiated, and applied to emitter follower Q3 which prevents loading of the horizontal sync detector. The modulator input and output signals are shown by waveforms A and C or Figure 15.

c. HORIZONTAL SYNC DETECTOR

Marker pulses from emitter follower Q3 are applied to Schmitt trigger Q4, Q5, and inhibit switch Q12. Each marker pulse triggers Schmitt trigger Q4, Q5, that supplies a signal to inhibit one-shot Q13, Q14 and charge one-shot Q6, Q7. The inhibit one-shot output, 10 milliseconds long, drives inhibit switch Q12 which in turn connects the Schmitt trigger input to ground. Operation of the inhibit switch prevents spurious pulses or noise spikes from triggering the charge one-shot for 10 milliseconds between marker pulses.

The charge one-shot, triggered by each detected marker pulse, drives current generator Q8, which in turn provides a constant charge current to capacitor C9 in the counter circuit. Five consecutive pulses from the Schmitt trigger provide the time required to charge capacitor C9 to the threshold level of unijunction timer Q9. When triggered, the unijunction timer provides a 4-microsecond sync pulse (waveform F) that is amplified and supplied to the shift generator. When activated, the shift generator supplies a signal to the charge one-shot which inhibits further operation for the duration of the earth-scan period. If 5 consecutive pulses are not detected, the charge one-shot returns to the off condition, the constant-current source to capacitor C9 is removed, and the charge in capacitor C9 is dissipated through resistor R20. Consequently, pulses spaced too far apart will not be integrated by the charge capacitor (See waveform E on Figure 15).

d. SHIFT GENERATOR

In the shift generator, the horizontal sync pulse sets flip-flop Q25, Q27 (assuming that the flip-flop was reset when power was turned on), and the ZERO output is used to inhibit the charge one-shot in the horizontal sync detector. Inhibiting the horizontal sync generator ensures that there is no interference during the printout of the video data. Simultaneously the negative-going

ONE output drives amplifier Q29 to cut off, capacitor C29 exceeds the threshold voltage of uninjunction timer Q30, and the output signal resets flip-flop Q27, Q25. The positive-going ONE output triggers the hold, phasing, and sample generators. It is essential that the flip-flop is reset during the 120.8-millisecond space scan; therefore, potentiometer R85 is adjusted until the positive-going ONE output occurs at least 530 milliseconds after the horizontal sync pulse. This ensures that the AGC function is performed when a maximum white-level signal is available. The output of the shift generator is shown by waveform G on Figure 15.

e. HOLD GENERATOR

The hold generator amplifies the output of the shift generator and energizes relay driver Q36 through OR gate Q34, Q35. Relay-driver Q36 energizes relay RY505 in the facsimile recorder, and power is applied to the drive motor and writing circuits. Since the output of the shift generator terminates at the end of the earth scan, the following means of maintaining the hold function is used. The turn-off voltage of the shift generator activates hold one-shot Q31, Q32 which delivers a voltage to the OR gate for a time sufficient to reactivate the shift generator. Thus a continuous voltage is supplied to the hold circuit in the facsimile recorder and relay RY505 is energized as long as sync pulses are detected. If sync is lost before phasing is complete the hold generator is disabled when the hold one-shot returns to the stable state. After phasing is complete, the output of inverter Q44 maintains the hold function for 8 seconds if horizontal sync is lost. The output of OR gate Q34, Q35 (a negative-going signal) also drives the start generator.

f. START GENERATOR

The output of OR gate Q34, Q35 in the hold generator (waveform K on Figure 15) is inverted by amplifier Q37 and used to set start flip-flop Q38, Q39. It is also applied to AND gate CR21, CR22. The ONE output of the flip-flop energizes relay-driver Q40, Q41, and relay RY901 in the facsimile recorder is energized. The closure of relay RY901 initiates an 8-second cycle during which phasing and AGC occurs. The positive-going ZERO output of start flip-flop, Q38, Q39 is applied to AND gate CR21, CR22. Since both the amplifier and ZERO output are positive, the AND gate is inhibited. If sync is lost before phasing is complete, the start flip-flop is reset by the negative-going output of amplifier Q37 and the flip-flop is ready for the next sync pulse. When phasing is complete, a signal (waveform N) from the facsimile recorder, resets the flip-flop, the relay driver is deenergized, and the AND gate is still inhibited. This circuit condition is maintained as long as sync is present. If sync is lost after phasing is complete, both inputs (waveforms L and M) are negative, AND

gate CR21, CR22 conducts, and one-shot Q42, Q43 is triggered. One output (waveform P) holds the flip-flop in the reset position for 7.5 seconds and prevents the flip-flop from being set if loss of sync is temporary (less than 7.5 seconds). A second output from one-shot Q42, Q43 is inverted by amplifier Q44 and applied to the relay driver in the hold generator. This prevents the loss of video for 7.5 seconds when sync is lost. If sync is lost for more than 7.5 seconds, the inhibit on the start flip-flop and the hold-relay driver is removed. The next sync pulse initiates a new hold and start cycle.

g. PHASING GENERATOR

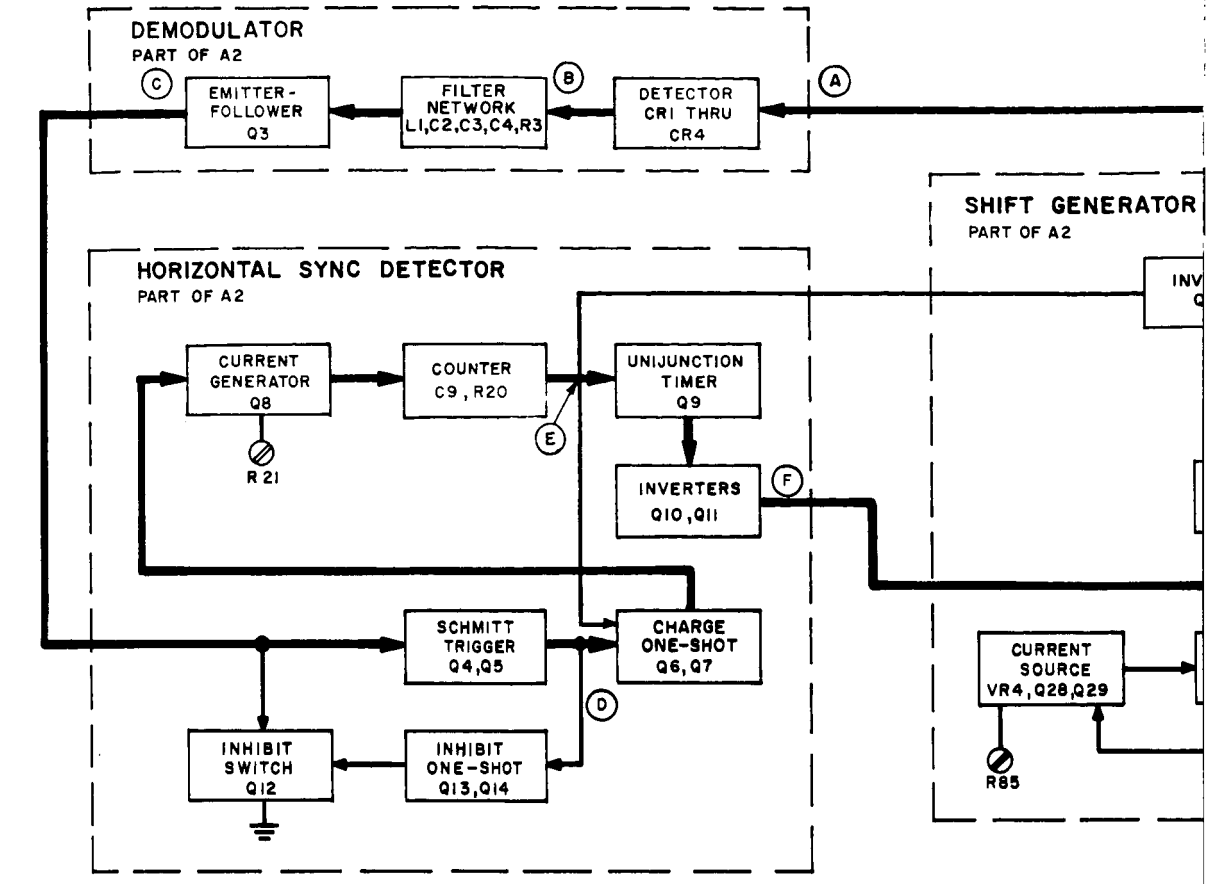
When the shift-generator output goes positive, phase-shift one-shot Q15, Q16 is triggered. The output, controlled by the HORIZ POSITION control (potentiometer R39) triggers phase one-shot Q18, Q19. Control of the phase-shift one-shot allows the earth scan readout to be locked-in at various horizontal positions on the facsimile printout. The 37-microsecond output of the phase one-shot, amplified to the proper levels by driver Q17, is applied to the phase-pulse detector in the facsimile recorder. The phase pulse and the control signal are shown by waveforms R and Q on Figure 15.

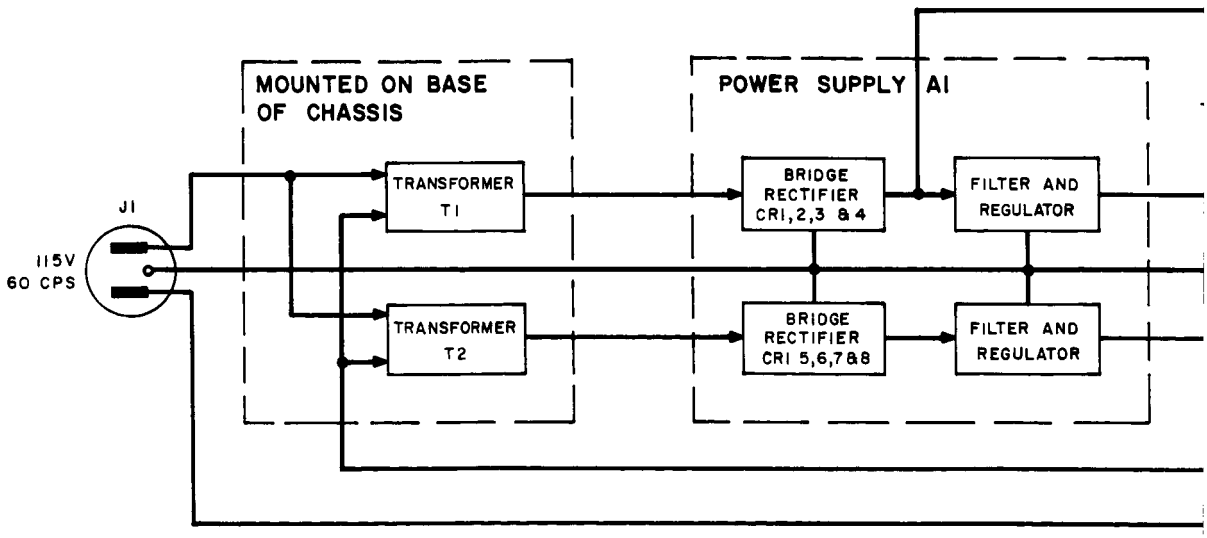
h. SAMPLE GENERATOR

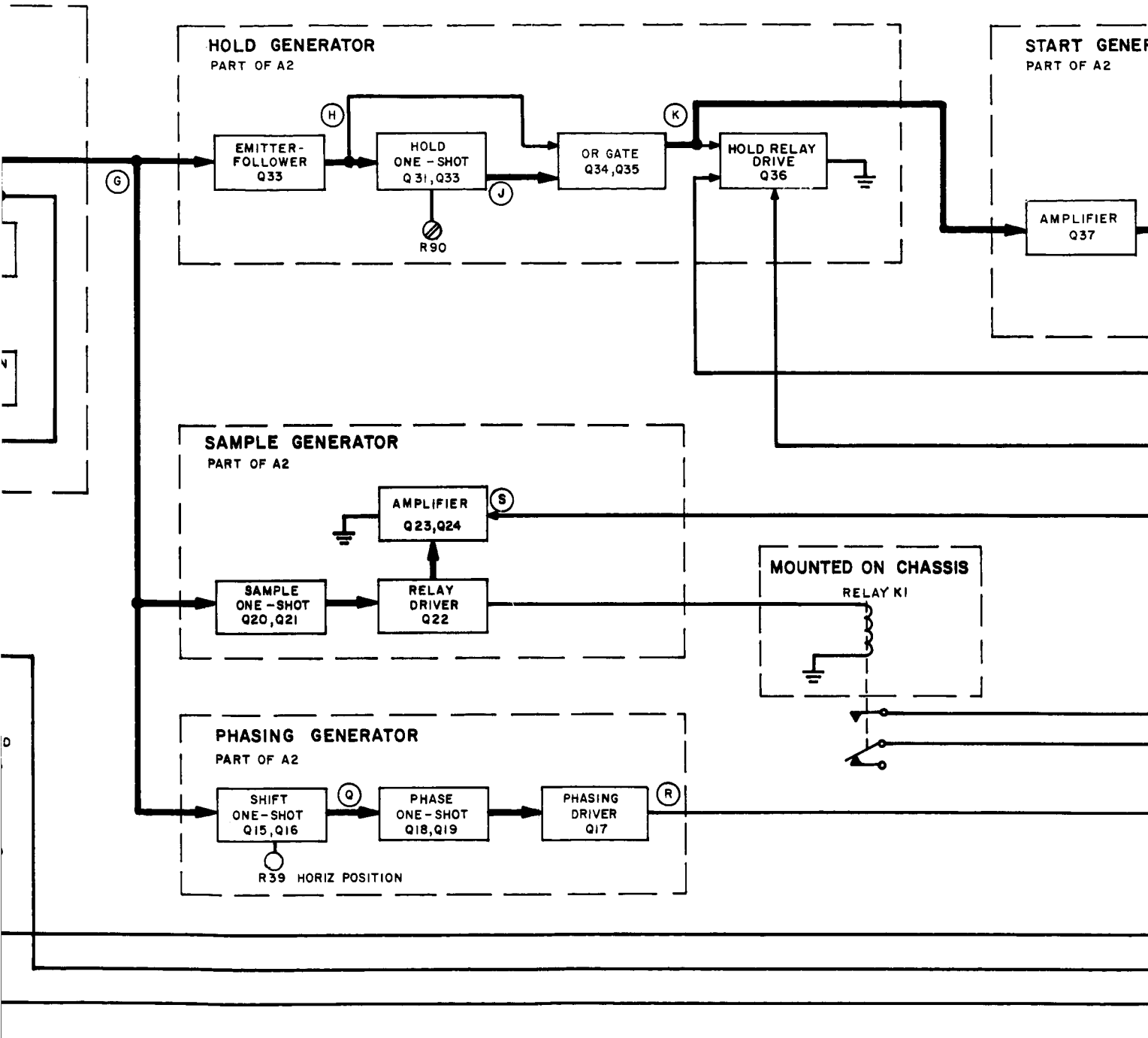
When relay RY901 in the facsimile recorder is energized by the start generator, minus 18-volts dc enables amplifier Q23, Q24, for 8 seconds and completes a ground for relay-driver Q22. When the shift-generator output goes positive, sample one-shot Q20, Q21 provides an 80 ± 8-millisecond pulse (waveform S) that drives the relay driver and relay K1 is energized. The closure of relay K1 switches 120 volts at 60 cps to the AGC motors in the facsimile recorder. When the phasing cycle ends, the ground circuit for the relay is opened and power switching ends, even though the sample one-shot continues to provide a signal for the duration of the HRIR signal.

i. POWER SUPPLY

The power supply provides power to the converter electronics and the marking-current relay in the facsimile recorder. Power is available when the selector switch is set to HRIR. Switching power on for the HRIR mode eliminates the possibility of interference during APT operation. Input power is stepped down by two transformers, rectified by two full-wave bridge circuits, and filtered. Each filter output (+15 vdc and -15 vdc) is shunted with a Zener diode that conducts when the filter output exceeds 15 volts dc. The unregulated output of the positive bridge is applied to the marker-current relay.


DEMODULATOR
PART OF A2
C
EMITTER-FOLLOWER Q3
FILTER NETWORK L1,C2,C3,C4,R3
B
DETECTOR CR1 THRU CR4
A
SHIFT GENERATOR
PART OF A2
INV
HORIZONTAL SYNC DETECTOR
PART OF A2
CURRENT GENERATOR Q8
R21
COUNTER C9, R20
E
UNIJUNCTION TIMER Q9
INVERTERS Q10, Q11
F
SCHMITT TRIGGER Q4,Q5
CHARGE ONE-SHOT Q6, Q7
D
INHIBIT SWITCH Q12
INHIBIT ONE-SHOT Q13,Q14
CURRENT SOURCE VR4, Q28, Q29
R85


MOUNTED ON BASE OF CHASSIS
POWER SUPPLY A1
J1
115V 60 CPS
TRANSFORMER T1
TRANSFORMER T2
BRIDGE RECTIFIER CR1,2,3 & 4
BRIDGE RECTIFIER CR1 5,6,7&8
FILTER AND REGULATOR
FILTER AND REGULATOR


HOLD GENERATOR
PART OF A2
START GENER
PART OF A2
EMITTER-FOLLOWER Q33
HOLD ONE-SHOT Q31,Q33
OR GATE Q34,Q35
HOLD RELAY DRIVE Q36
AMPLIFIER Q37
R90
G
H
J
K
SAMPLE GENERATOR
PART OF A2
AMPLIFIER Q23,Q24
S
SAMPLE ONE-SHOT Q20,Q21
RELAY DRIVER Q22
MOUNTED ON CHASSIS
RELAY K1
PHASING GENERATOR
PART OF A2
SHIFT ONE-SHOT Q15,Q16
Q
PHASE ONE-SHOT Q18,Q19
PHASING DRIVER Q17
R
R39 HORIZ POSITION

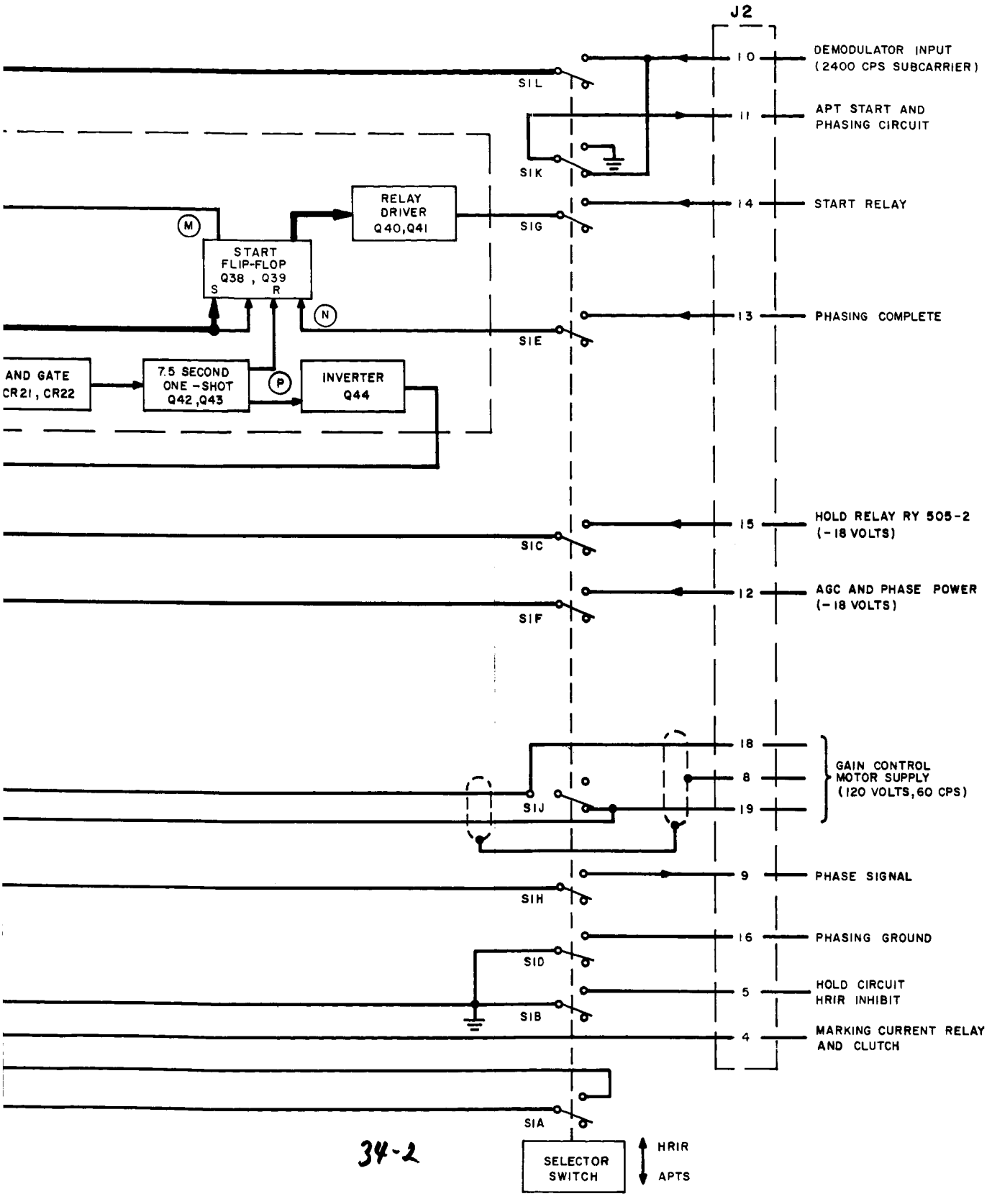


Figure 16. HRIR Converter Block Diagram

SECTION IV

OPERATING INSTRUCTIONS

A. GENERAL

This section contains the general instructions for interconnecting and operating the RCA modification to the facsimile recorder. For information concerning the remainder of the ground station, refer to the "Automatic Picture Transmission Ground Station, Installation, Operation, and Maintenance Manual," issued by Fairchild Stratos on March 15, 1963.

B. OPERATING CONTROLS

The only operating controls involved as a result of this modification are those located on the front panel of the HRIR Converter. These are shown on Figure 5 and listed in Table 3.

C. PREPARATION FOR USE

When the modifications detailed in Section II have been completed, connect the HRIR Converter to the recorder in accordance with interconnecting diagram Figure 17. Prepare the recorder for operation in accordance with the "Automatic Picture Transmission Ground Station, Installation, Operation, and Maintenance Manual," issued by Fairchild Stratos March 15, 1963.

D. OPERATING INSTRUCTIONS

The following is the recommended sequence for operation of the Fairchild facsimile recorder in the HRIR mode:

a. Set the APT-HRIR switch to HRIR. This will apply power to the HRIR Converter and illuminate the POWER ON indicator.

b. Set the HORIZ POSITION control to the desired position for desired location of the video display, on the printout.

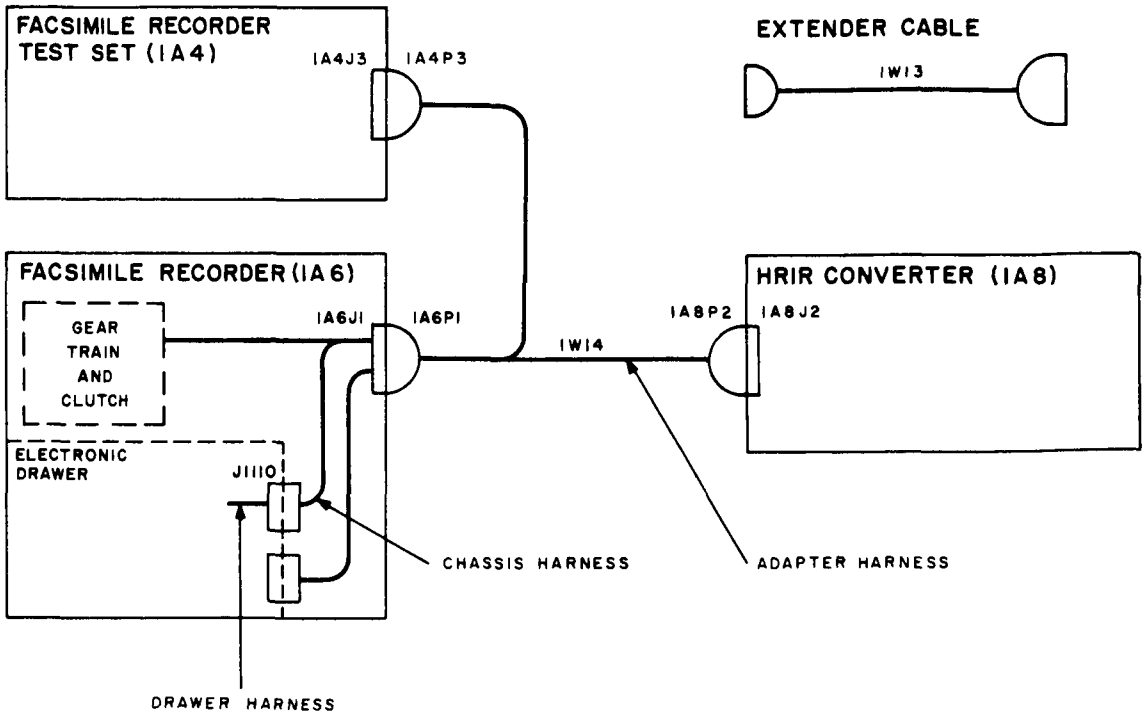


Figure 17. Facsimile Recorder and HRIR Interconnections

c. Set the POWER switch to ON on the Fairchild Facsimile Recorder. (EMERGENCY mode OFF.)

d. When a subcarrier signal is received the paper feed drive will start, the recorder AGC will function, and phasing and printout will start.

NOTE

The HORIZ POSITION control is effective only for initial phasing of the picture. Once the Recorder has completed phasing, the control is ineffective. If it is desired to shift the picture on the printout the manual shift button on the recorder should be used.

It is recommended that when switching from the APT to the HRIR mode, the Fairchild Recorder be turned off, the HRIR mode be selected at the HRIR Converter and then power be applied to the Fairchild Recorder. This will minimize stress on the gear-reduction unit. Changing from HRIR to APT mode may be performed with the equipment operating.

Table 3. Operating Control Functions, HRIR Converter

Control	Ref Desig	Function
HORIZ POSITION	R1	Positions the facsimile display on the recorder.
APT-HRIR	S1	In APT position, the recorder operates from APT signals. In HRIR position the HRIR Converter is energized and the system operates from HRIR signals.
HRIR POWER ON	DS1	Indicator is illuminated when recorder is turned on and the APT-HRIR switch is set at HRIR.

E. TURN-OFF PROCEDURE

Refer to the "Automatic Picture Transmission Ground Station, Installation, Operation and Maintenance Manual," issued by Fairchild Stratos on March 15, 1963. Set the APT-HRIR control on the HRIR Converter to APT.

SECTION V

TEST AND ALIGNMENT PROCEDURE

A. GENERAL

This section contains the test and alignment procedures for the HRIR modification of the Fairchild Facsimile Recorder. In addition, the typical waveform data are furnished. These, together with the "Automatic Picture Transmission Ground Station, Installation, Operation, and Maintenance Manual", issued by Fairchild Stratos, and the engineering drawings of Section 6, should provide rapid fault-isolation information.

B. TEST EQUIPMENT

The test equipment listed in Table 4 is required to test and adjust the HRIR modifications to the Fairchild Recorder. Equivalent equipment may be substituted.

Table 4. Test Equipment

Quantity	Item	Manufacturer	Model
1	Pre-Recorded Tape	RCA	—
1	Tape Recorder	Ampex	PR10
1	Oscilloscope	Tektronix	535A
1	Plug-in, Dual-trace	Tektronix	CA

C. MODIFICATION TEST PROCEDURE

After completion of the modification and the adjustment of the marker current as indicated in Paragraph D1, test the Fairchild Facsimile Recorder be tested using this procedure.

A pre-recorded tape of HRIR test signal (gray scale) is supplied with the modification kit. Using this tape, an Ampex tape recorder, and the Fairchild Test Set, the test may be performed. (See Figure 18 for interconnection of the test equipment).

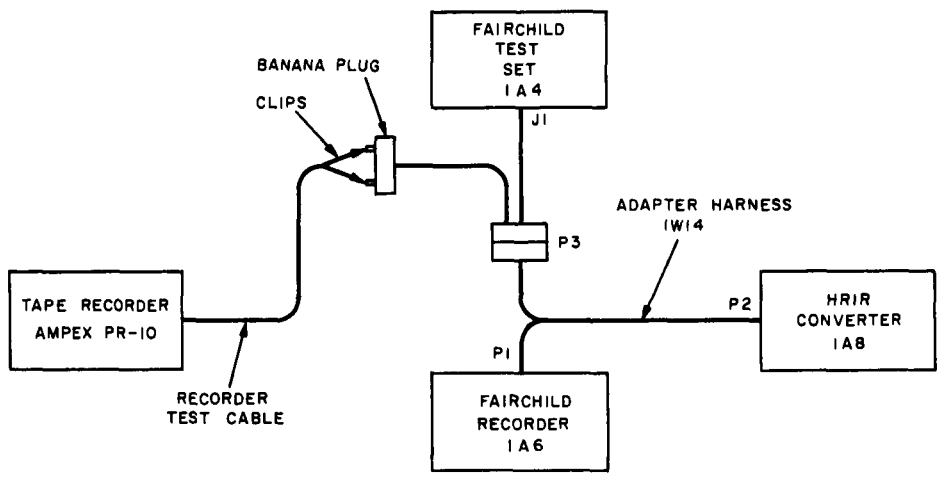


Figure 18. Test Set-up for HRIR Modification Checkout

The pre-recorded tape has the HRIR signal with grey scale recorded over the entire length at 3-3/4 inches per second on Channel A. Interconnect J2 of the Test Set with J2 of the Facsimile Recorder. The Test Set should be placed in the OPERATE mode and EMERGENCY mode selected at the Facsimile Recorder. In this mode of operation the Test Set will receive the 2400-cps signal from the tape and control the frequency of the recorder motor to synchronize the speed of the recorder drum with the recorded data from the tape. The reproduce output level control of the tape recorder shall be adjusted for a signal level of 2.2 volts peak-to-peak at the input to the Facsimile Recorder. The grey scale should appear in the position on the printout as determined by the position control on the front panel of the HRIR Converter. The printout should be examined for the presence of six distinct gradations of grey.

D. ALIGNMENT PROCEDURE

1. HRIR Marker Current Adjustment

Adjustment of the Marker Current Control (potentiometer R503) in the Fairchild recorder drawer shall be performed by inserting the following

step between steps 8 and 9 of Section 6.3.a, Recorder Adjustments, page 6-8, of the Installation, Operation and Maintenance Manual for the Fairchild Recorder:

"8a. Depress S501 and adjust potentiometer R503 for a maximum marker current of 58 ± 1.5 ma dc."

2. Charging Current Adjustment

Adjustment of the Charging Control (potentiometer R21) shall be performed as follows:

a. Connect a 10-to-1 probe from the oscilloscope to the junction of C9, R20 and the collector of Q8. See Figure 13 for test-point location. Sync the oscilloscope on EXTERNAL using the input signal at C1. Adjust R21 so that Q9 fires on the fifth marker pulse. A typical waveform (charging current), taken at the junction of C9 and R20, is shown in Figure 19. The waveform derived at the junction of R28 and C10 (horizontal sync pulse) is shown in Figure 20 and the resultant waveform, (phasing pulse output) at the junction of R49 and C17 is shown in Figure 21.

3. Shift Generator Adjustment

Adjustment of the Shift Generator Control (potentiometer R85) changes the width of the output signal from the Shift Generator flip-flop, Q25 and Q27. To adjust, connect an oscilloscope probe to the junction of R71-R74 and sync the oscilloscope with the horizontal sync pulse at the junction of R28 and C10. See Figure 13 for test point location. Adjust R85 to provide a width of approximately 538 milliseconds during the negative portion of the waveform. A typical waveform (shift generator output) is shown in Figure 22.

4. Hold One-shot Adjustment

Adjust the Hold One-shot control (potentiometer R90) by connecting the oscilloscope probe to R97 and sync the oscilloscope with the horizontal sync pulse from the junction of R28 and C10. A typical waveform (hold one-shot output) is shown in Figure 23. Adjust R90 so that the negative-going portion of the waveform extends beyond the start of the next shift generator output. The base of Q34 (R97) will therefore remain negative, provided the HRIR signal is being received. A typical waveform (sample one-shot output) taken from the junction of R63 and C22 is shown in Figure 24.

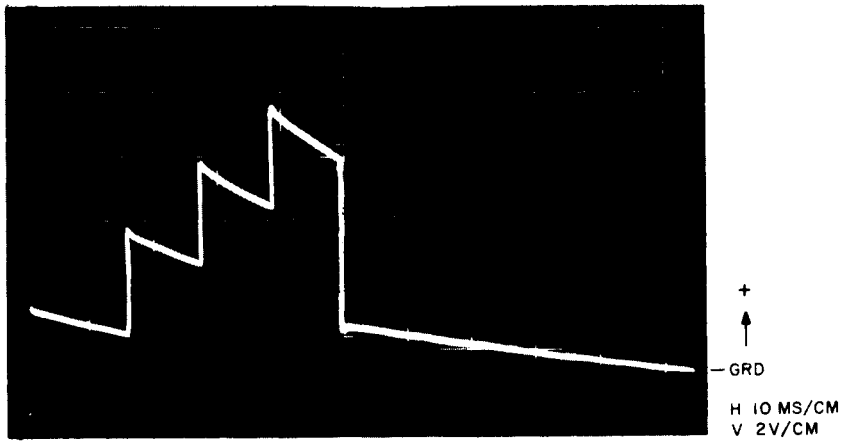


Figure 19. Typical Charging Circuit Waveform

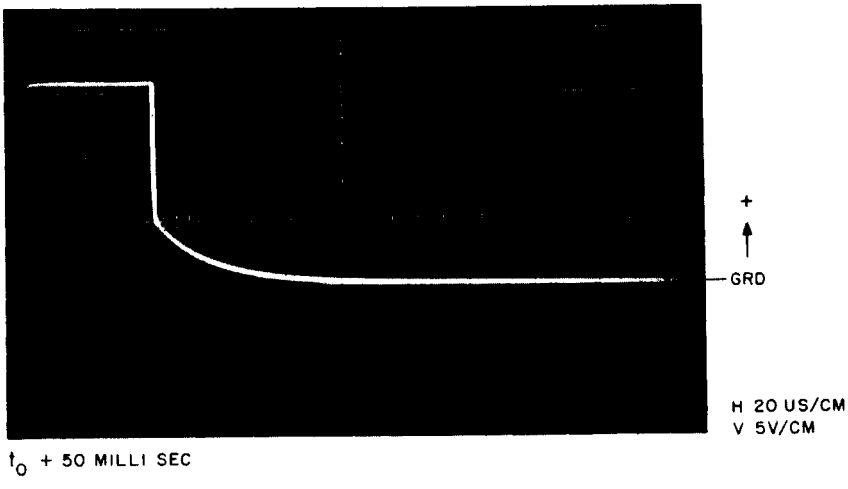


Figure 20. Typical Horizontal Sync Pulse Waveform

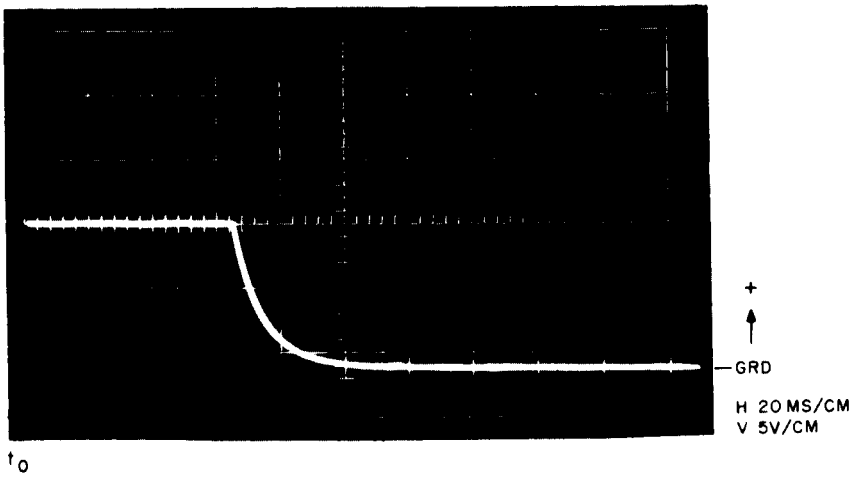


Figure 21. Typical Phasing Pulses Output Waveform

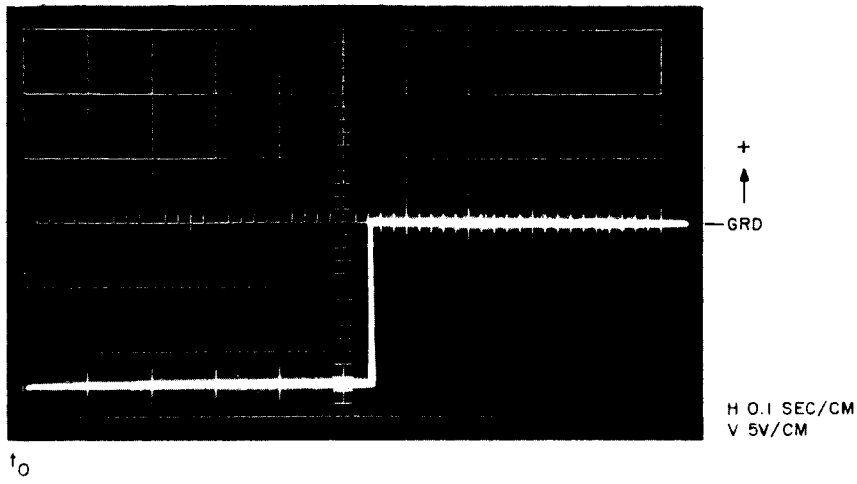


Figure 22. Typical Shift Generator Output Waveform

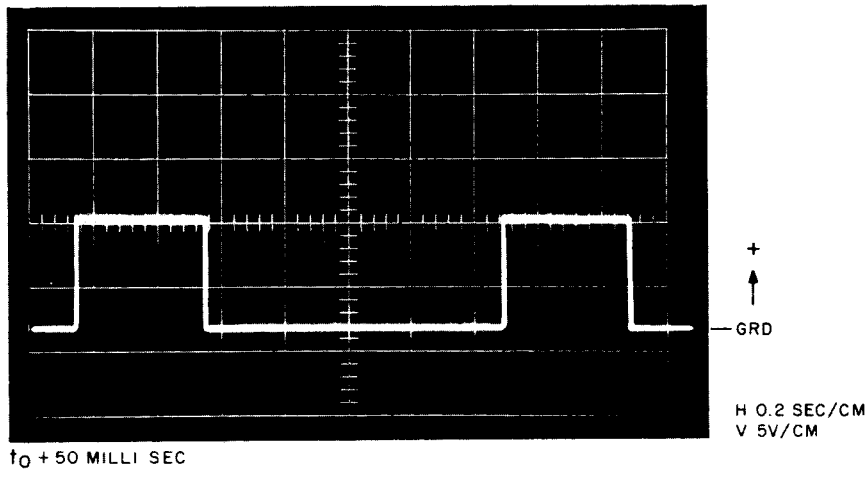


Figure 23. Typical Hold One-shot Output Waveform

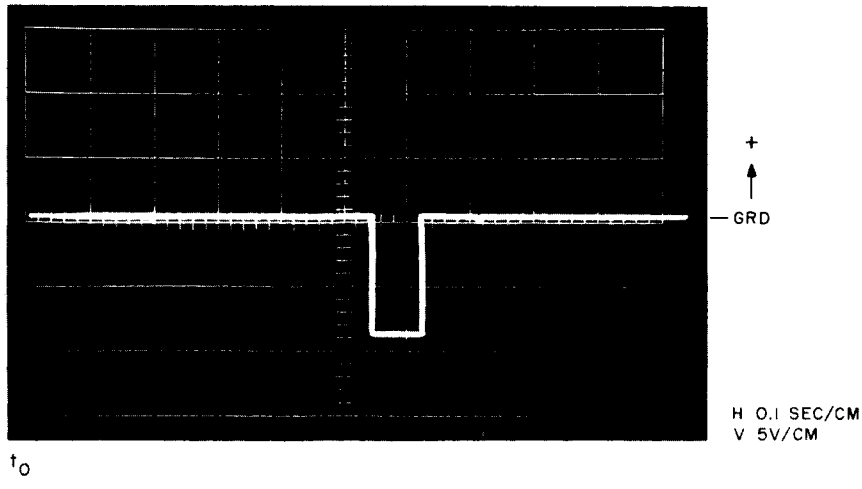


Figure 24. Typical Sample One-Shot Output Waveform

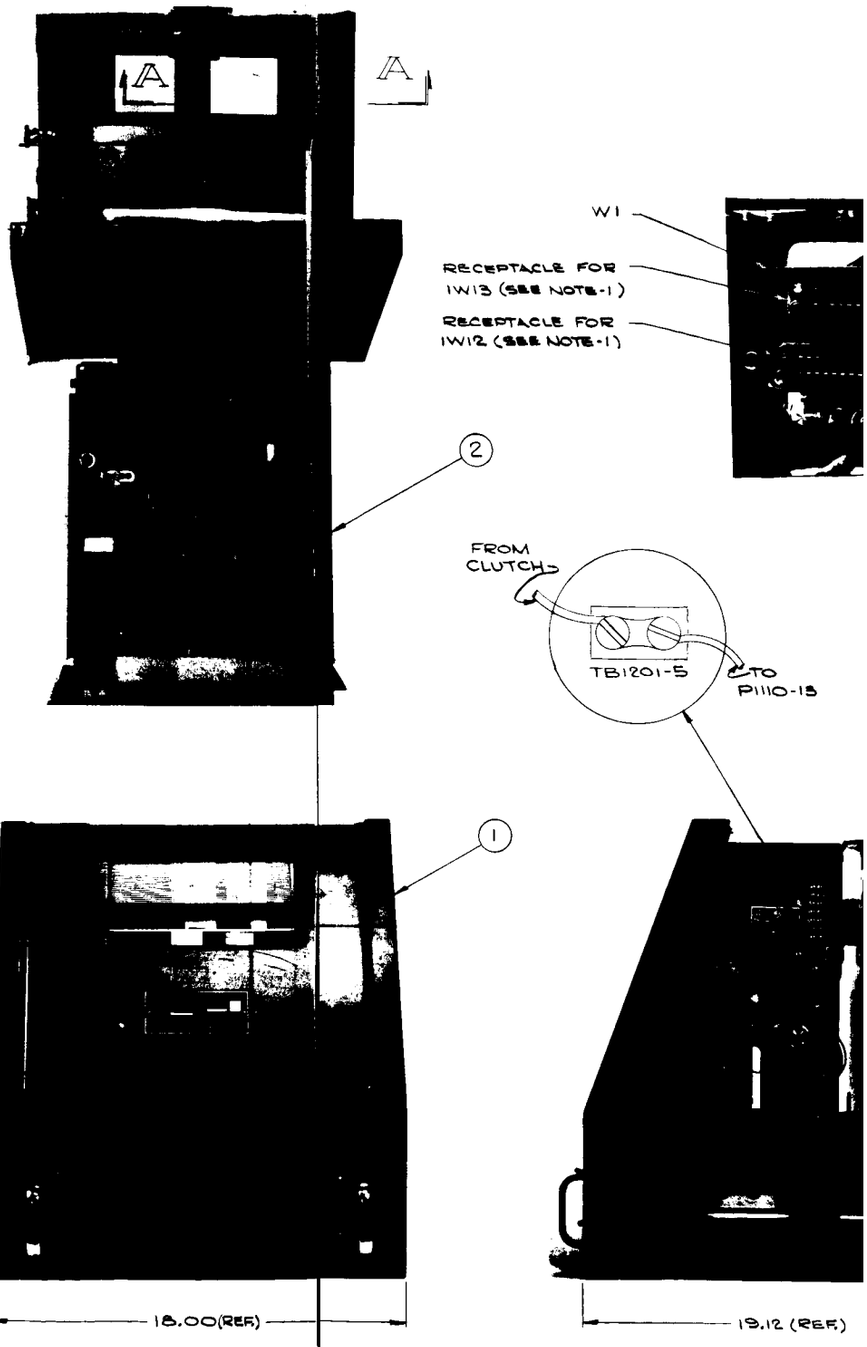
SECTION VI

ENGINEERING DRAWINGS

This section contains engineering drawings to supplement the text and aid in part location. Table 5 is the list of engineering drawings.

Table 5. Engineering Drawings

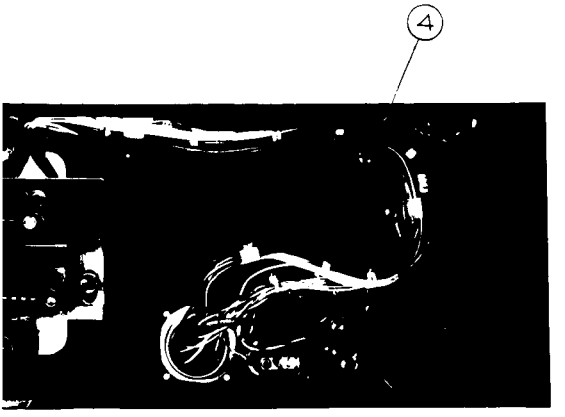
Nomenclature	RCA Dwg. No.	Figure Number
Facsimile Recorder Assembly	1843778	25
Extender Cable (1W13)	1848252	26
Harness Assembly, Chassis	1848265	27
Installation and Harness Assembly	1843736	28
Harness Assembly, Drawer	1848261	29
Reduction Gear Assembly	1723737	30
Adapter Harness (1W14)	1848271	31
HRIR Converter Assembly	1723499	32
Schematic	1723763	33
Power Supply Assembly (A1)	1843492-502	34
Component Board Assembly (A2)	1843905	35



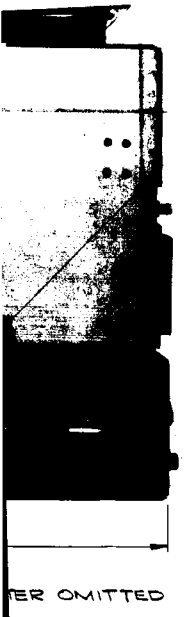
BACK COVER & CUT
ON THIS DWG

NOTES:

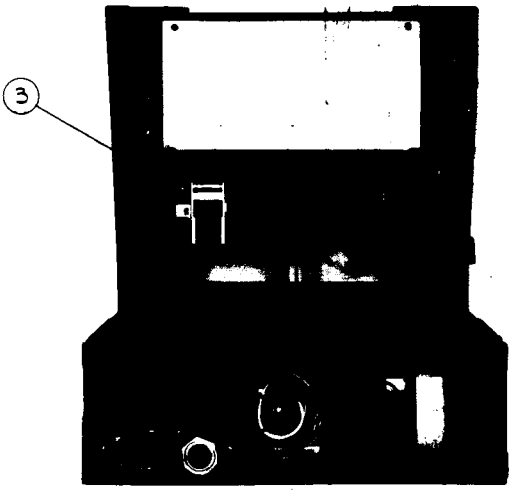
1. CABLES 1W12 & 1W13 ARE FURNISHED AS ACCESSORIES FOR REPAIR & TEST OF EQUIPMENT. THEY ARE NOT USED AS PART OF THE EQUIPMENT IN NORMAL OPERATION.
2. Ø INDICATES GOVERNMENT FURNISHED EQUIPMENT SHOWN FOR REFERENCE PURPOSES ONLY AND DOES NOT CONSTITUTE PART OF THIS DWG.



SECTION A-A

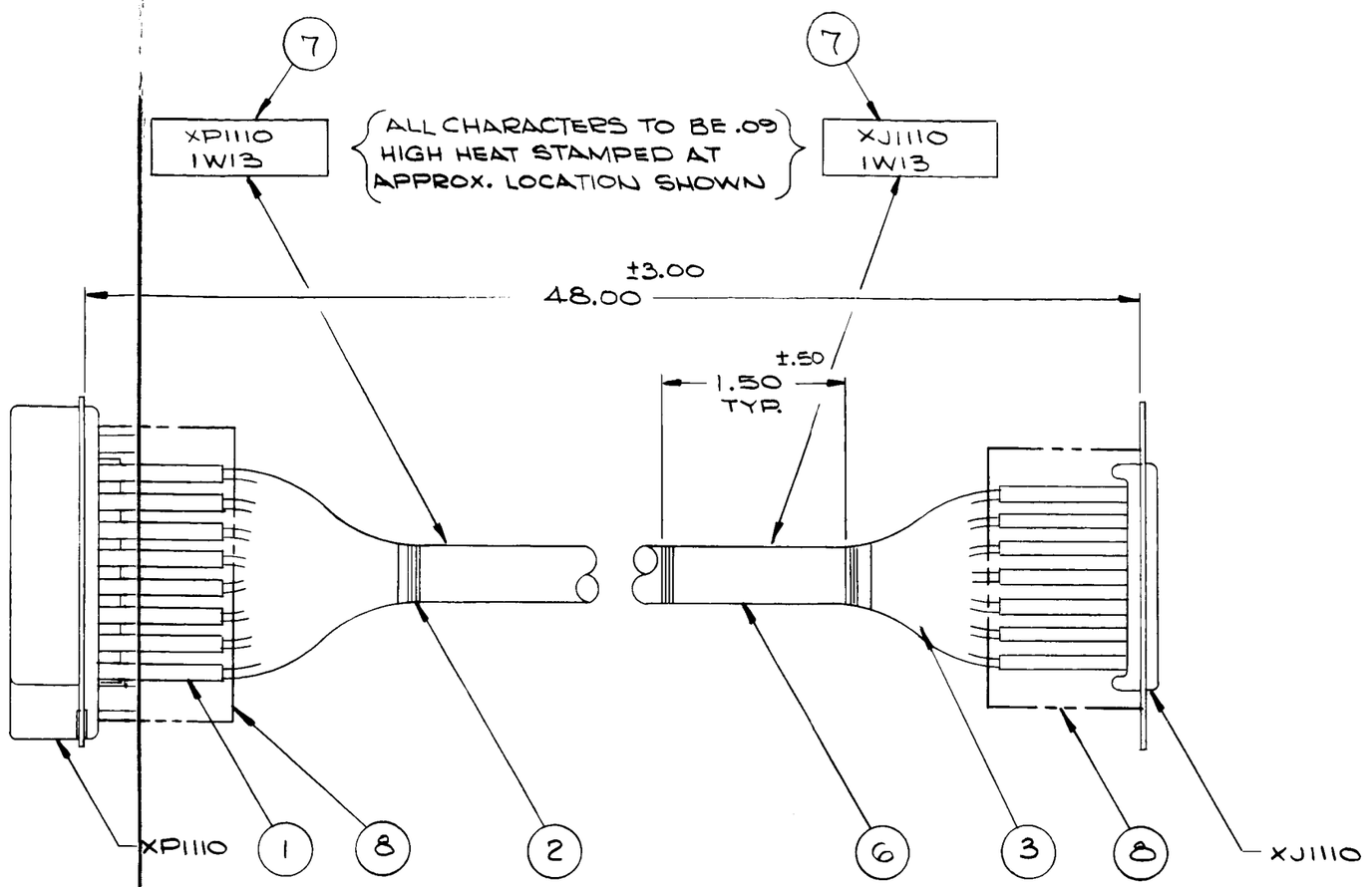


ER OMITTED



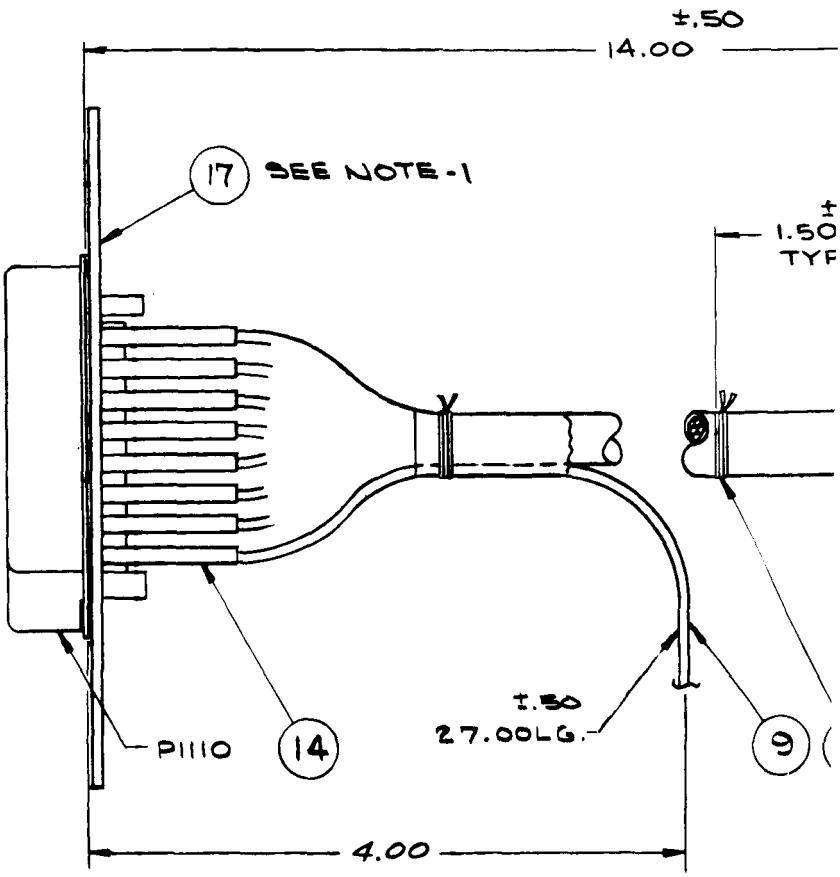
FAN UNIT OMITTED IN THIS VIEW

Figure 25. Facsimile Recorder Assembly, RCA Dwg 1843778 Rev. A



ITEM NO.	TO	FROM
3	XP1110-8	XJ1110-8
3	XP1110-3	XJ1110-3
3	XP1110-4	XJ1110-4
3	XP1110-5	XJ1110-5
3	XP1110-6	XJ1110-6
3	XP1110-7	XJ1110-7
5 (WHT.)	XP1110-1	XJ1110-1
5 (BLK.)	XP1110-9	XJ1110-9
5 (SHD.)	XP1110-10	XJ1110-10
3	XP1110-12	XJ1110-12
3	XP1110-13	XJ1110-13
3	XP1110-14	XJ1110-14
3	XP1110-15	XJ1110-15
3	XP1110-16	XJ1110-16

Figure 26. Extender Cable 1W13,
RCA Dwg 1848252 Rev. B



CONNECTION LIST			
ITEM NO.	FROM	TO	TO
7	P1110-8	1A6P1-3	——
2	P1110-3	1A6P1-10	——
3	P1110-4	1A6P1-33	——
4	P1110-5	1A6P1-31	——
5	P1110-6	1A6P1-28	——
6	P1110-7	1A6P1-13	——
1 (WHT.)	P1110-1	1A6P1-34	——
1 (BLK.)	P1110-9	1A6P1-35	——
1 (SHLD.)	P1110-10	1A6P1-18	——
8	P1110-12	1A6P1-30	——
9	P1110-13	1A6P1-14	——
10	P1110-14	1A6P1-29	——
11	P1110-15	1A6P1-32	——
12	P1110-16	1A6P1-4	——
9	P1110-13	——	TB1201-5

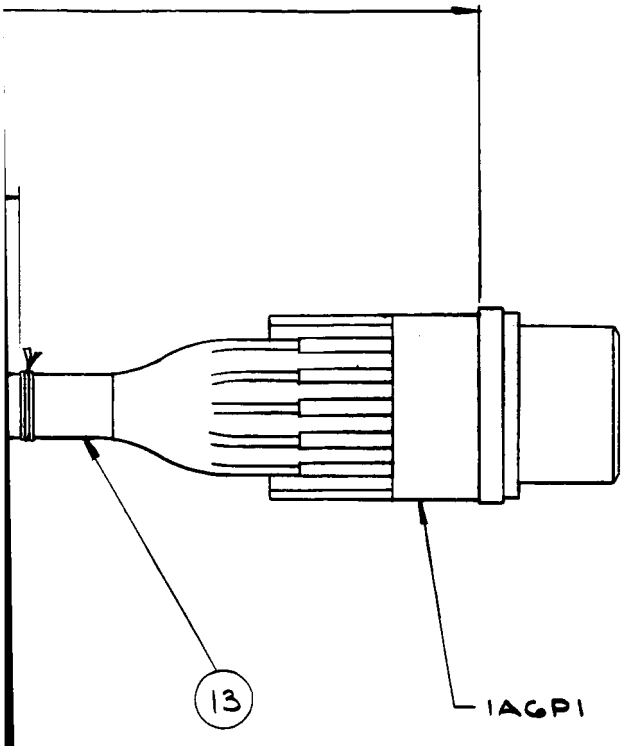
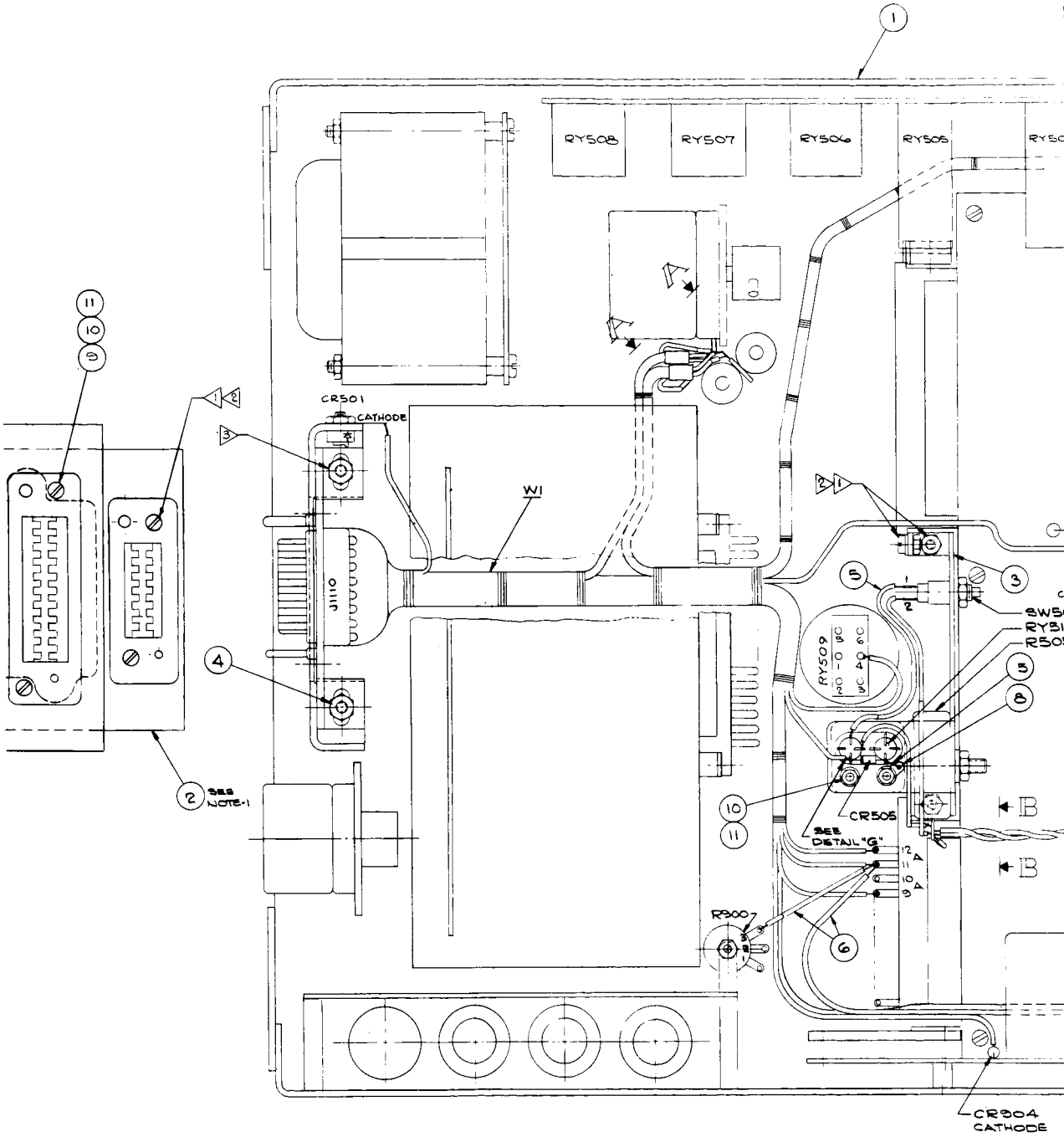
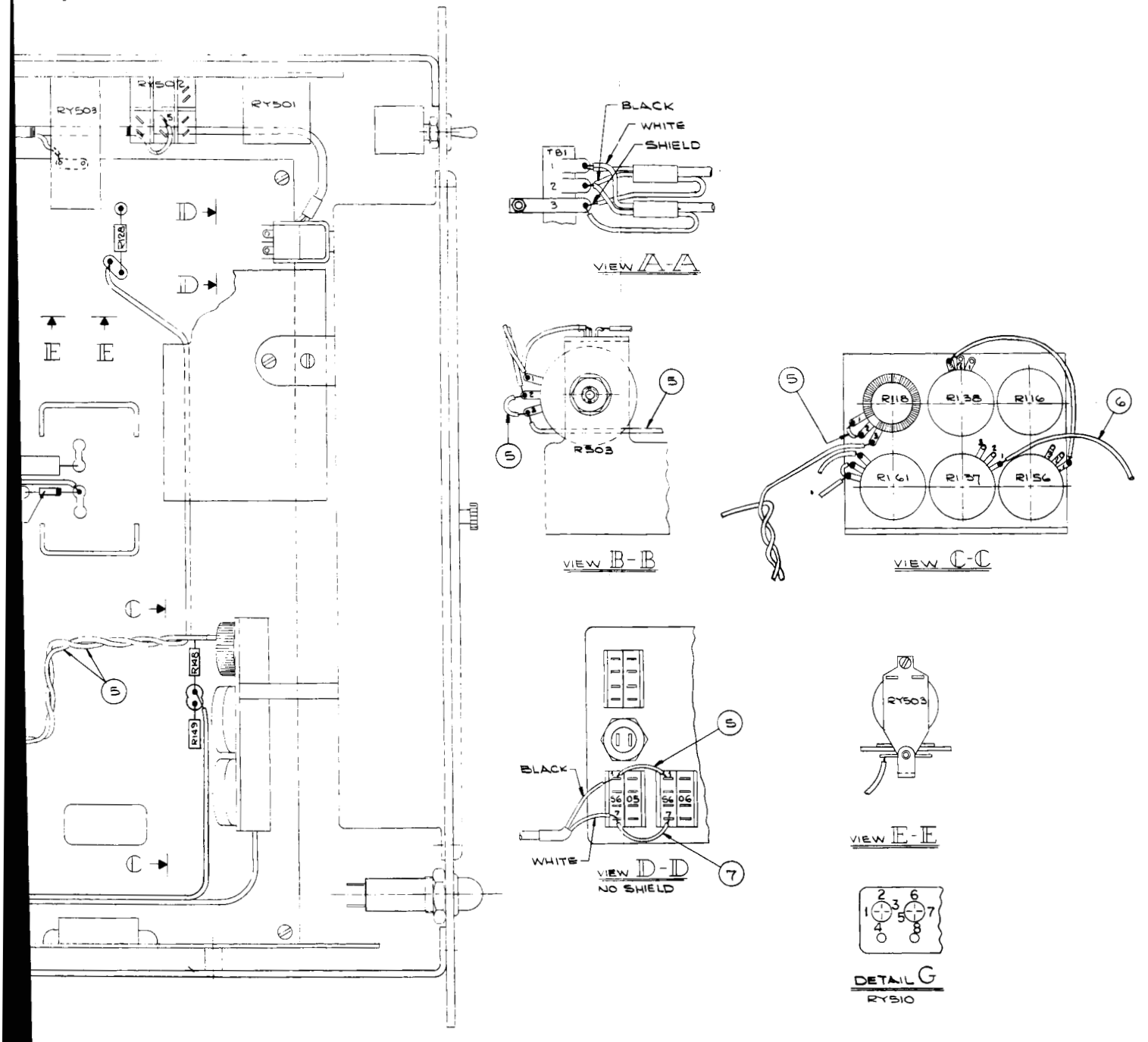


Figure 27. Harness Assembly, Chassis
RCA Dwg 1848265 Rev. B



CONNECTION LIST			
ITEM	FROM	TO	LGTH. IN. IN.
6	A11	R500-3	3.00
6	A11	R137-1	14.00
5	RY510-2	SW501-1	6.00
5	RY510-3	R503-1	2.00
5	RY510-8	ITEM-8	1.00
5	R503-3	SW501-2	7.00
5	R503-3	R505-2	1.00
5	R503-2	R118-5	7.00
5	R503-1	R128	14.00
—	CR505-C	RY510-4	—
—	CR505-A	RY510-8	—
5	5605-1	5606-1	1.00
7	5605-7	5606-7	1.00
5	R156-1	R138-3	5.00

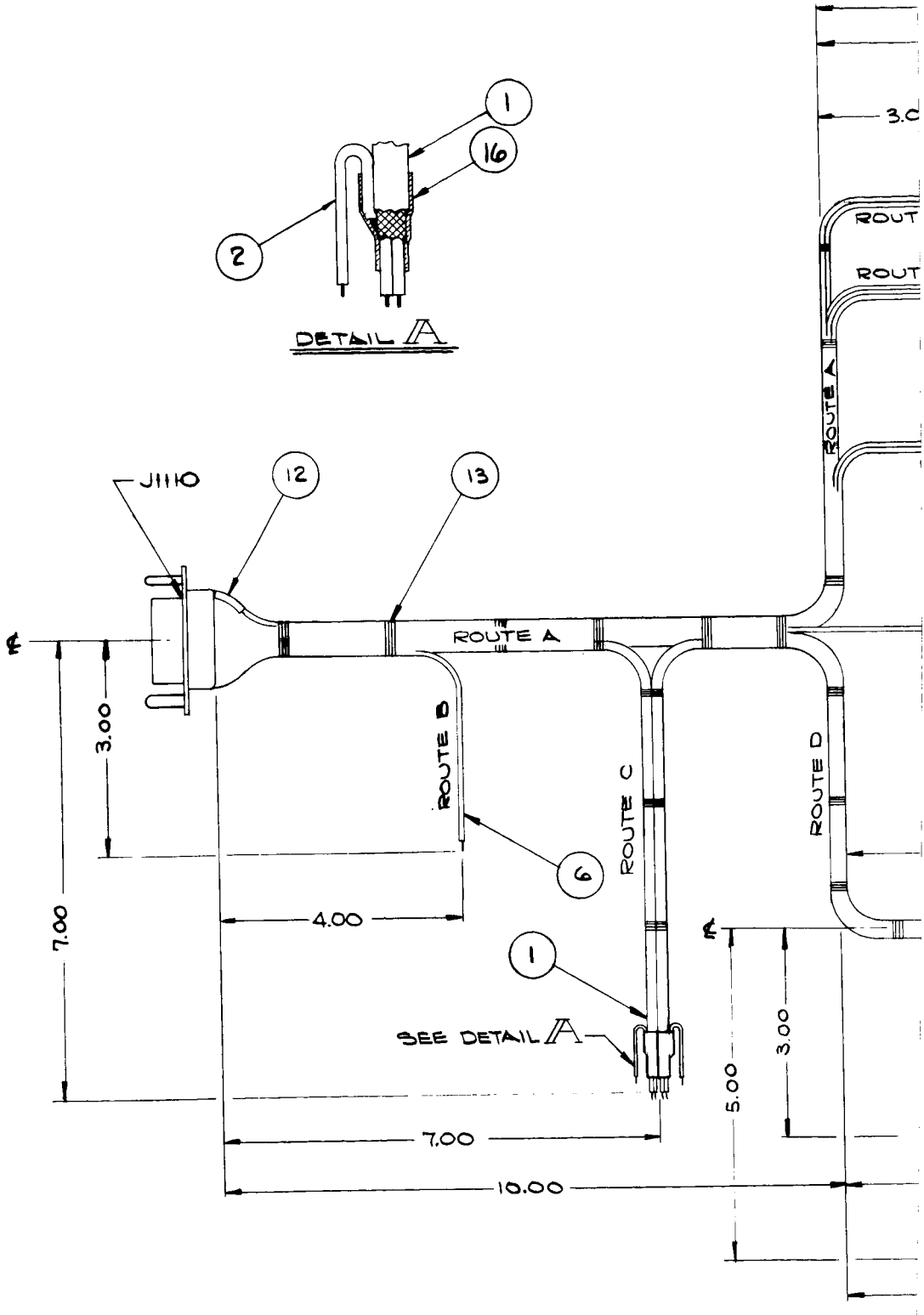
LIST O
QTY.
6
6
2



RTS SALVAGED	
	DESCRIPTION
	UT, HEX #4-40
	CREW, PAN HD. #4-40
	UT. HEX #8-32

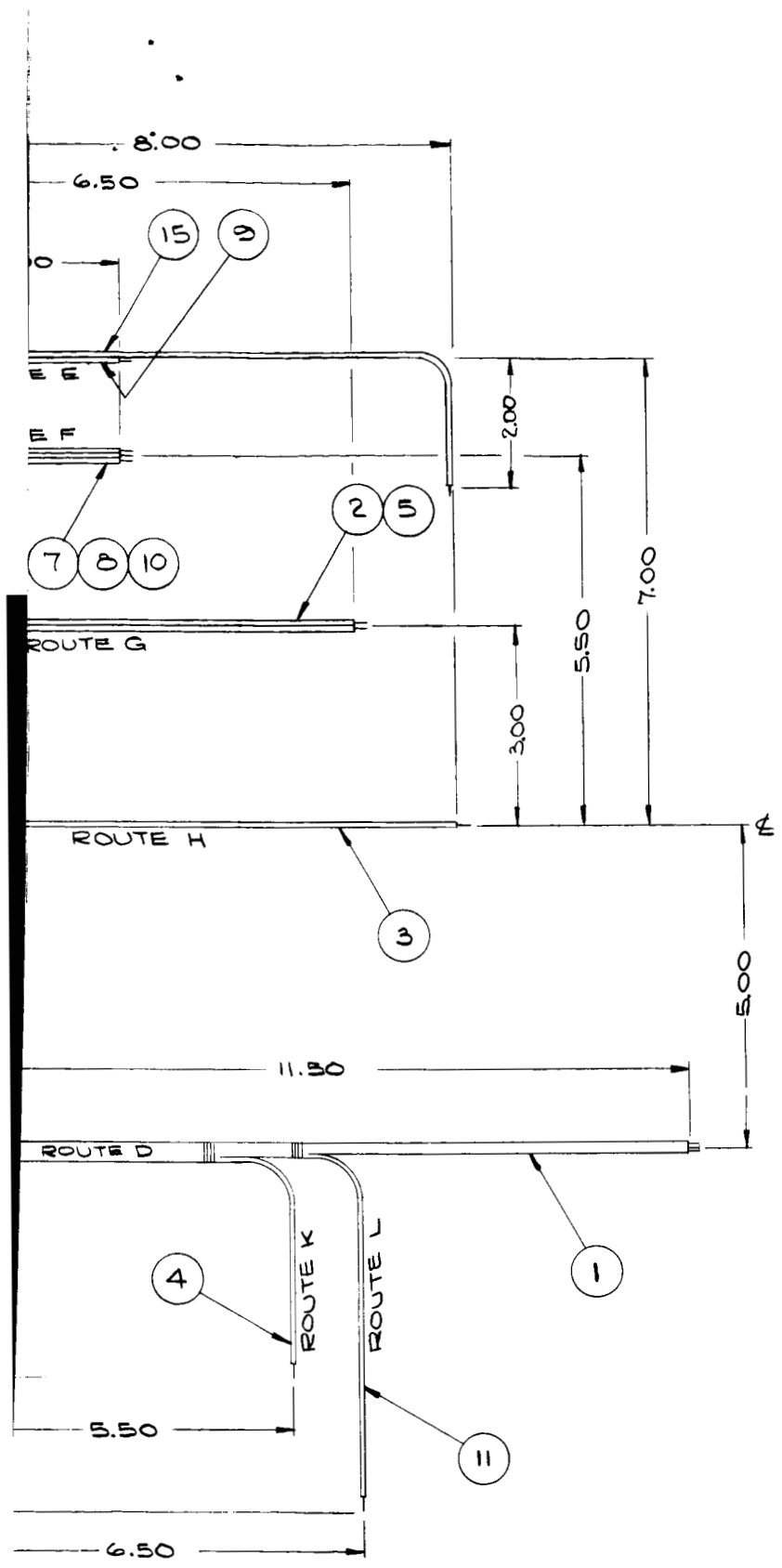
LIST OF PARTS DELETED	
QTY.	DESCRIPTION
2	SCREW, PAN HD. #8-32
1	WIRE, FROM R118-3 TO R128, RED/WHITE
1	WIRE, FROM R137-1 TO R138-3, BLACK
1	WIRE, FROM R137-1 TO R156-1, BLACK
2	BRACKET, ANGLE

Figure 28. Installation and Harness Assembly, RCA Dwg. 1843736 Rev. A



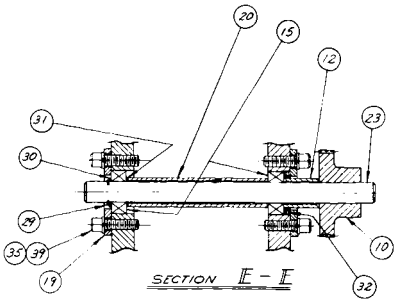
NOTES:

1. WIRE DESTINATION DESIGNATIONS REFER TO DESIGNATIONS SHOWN ON INSTALLATION DWG. 1843736 .

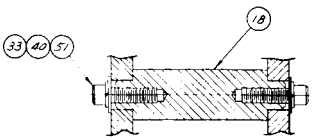


CONNECTION LIST				
ITEM	FROM	ROUTE	LGN. IN IN.	TO (SEE NOTE-1)
8	J1110-8	AF	18.50	A12
3	J1110-3	AH	18.00	CR107-CATH.
15	J1110-4	AE	27.00	R148 & R149
7	J1110-5	AF	18.50	A9
11	J1110-6	ADL	26.50	RY502-5
6	J1110-7	AB	7.00	CR501-CATH.
1(WHT.)	J1110-1	AC	14.00	TB1-1
1(BLK.)	J1110-9	AC	14.00	TB1-2
1(SHLD)	J1110-10	AC	14.00	TB1-3
9	J1110-12	AE	20.00	CR304-CATH.
5	J1110-13	AG	19.50	RY510-4
4	J1110-14	ADK	23.50	RY503-4
2	J1110-15	AG	19.50	RY509-4
10	J1110-16	AF	18.50	A11
1(WHT.)	TB1-1	CAD	26.50	S605-7
1(BLK.)	TB1-2	CAD	26.50	S605-1
1(SHLD)	TB1-3	CAD	26.50	TERMINATE

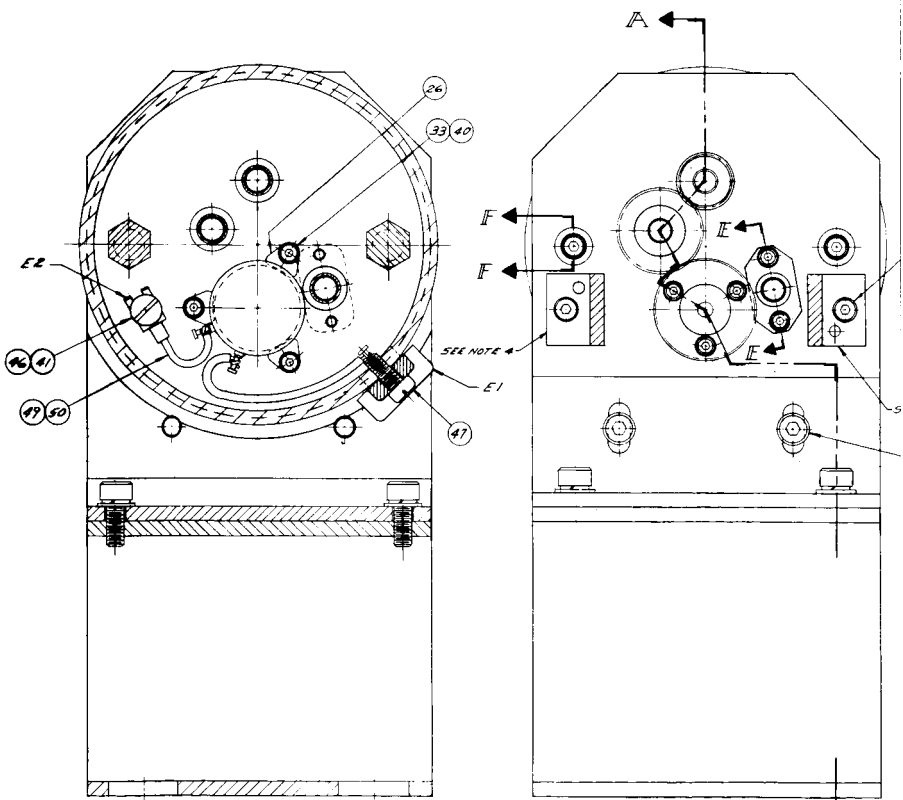
Figure 29. Harness Assembly, Drawer, RCA Dwg 1848261 Rev. A



SECTION E - E



SECTION F - F



SECTION C - C

SECTION B - B

NOTES:
1. BEARINGS ARE TO BE SHIMMED BETWEEN SPACERS, ITEMS 7 & 20 AND BEARINGS ITEMS 6 & 21 TO GUARANTEE A PRELOAD OF .002 (APPROX. 9 SHIMS REQUIRED, ITEM 31, PER SHAFT).
2. LUBRICATE ALL GEAR TEETH WITH GREASE, ITEM 52.
3. ITEMS 1 & 2 ARE MATCHED PAIRS AND ARE NOT TO BE INTERCHANGED.
4. BEARING ITEM 28, SHAFT ITEM 27 AND BEARING RETAINER ITEM 25 ARE TO BE ALIGNED WITH CLUTCH ITEM 41 TO HAVE A MAX. SHAFT RUN-OUT OF .001 T.I.R.
5. FOR ASSEMBLY SEE RCA DWG 1840901
6. APPLY LOCKTITE(RCA#8954869-27)TO ALL SCREWS THAT DO NOT HAVE LOCKWASHERS

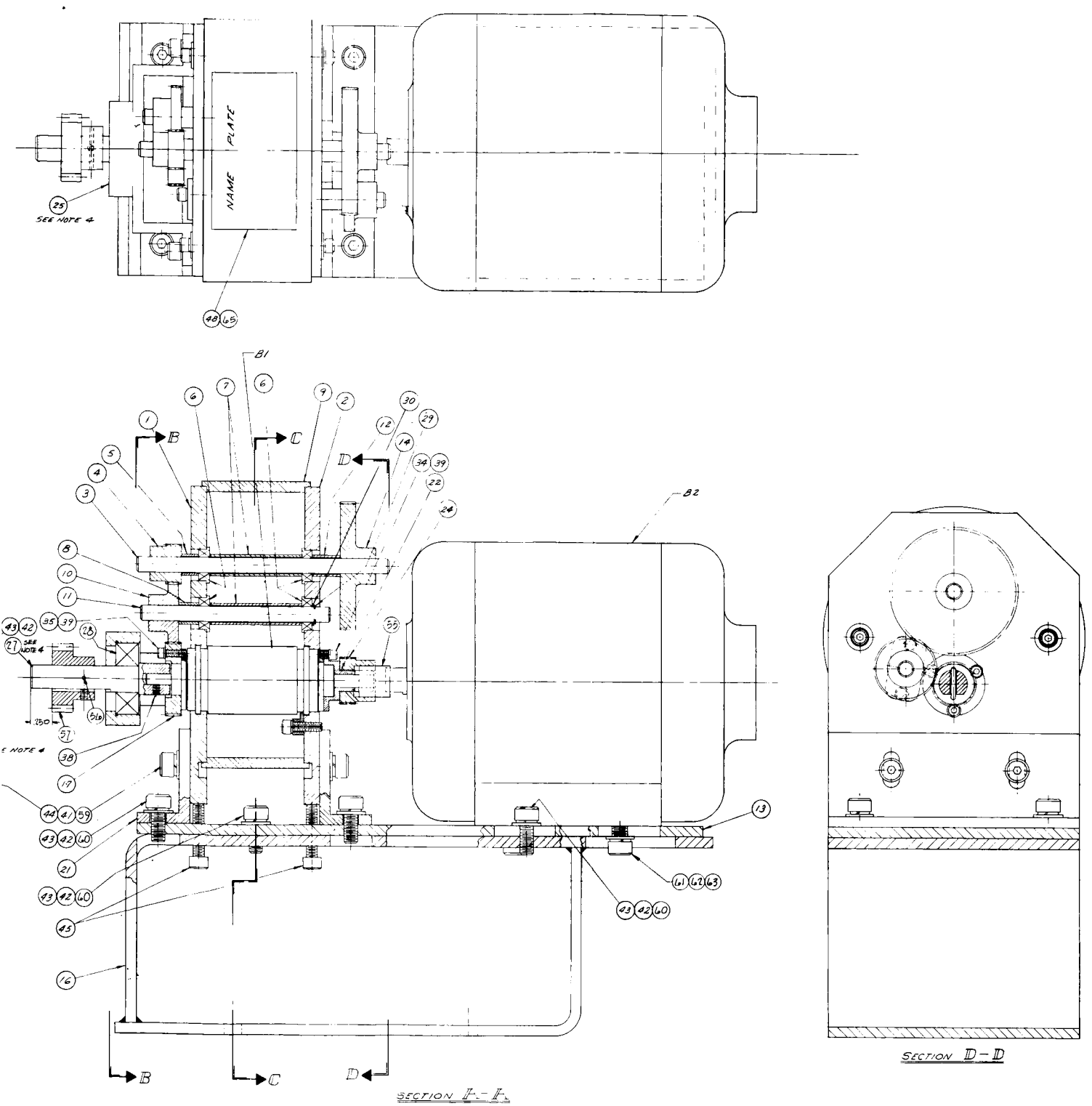
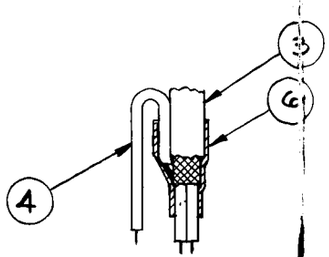
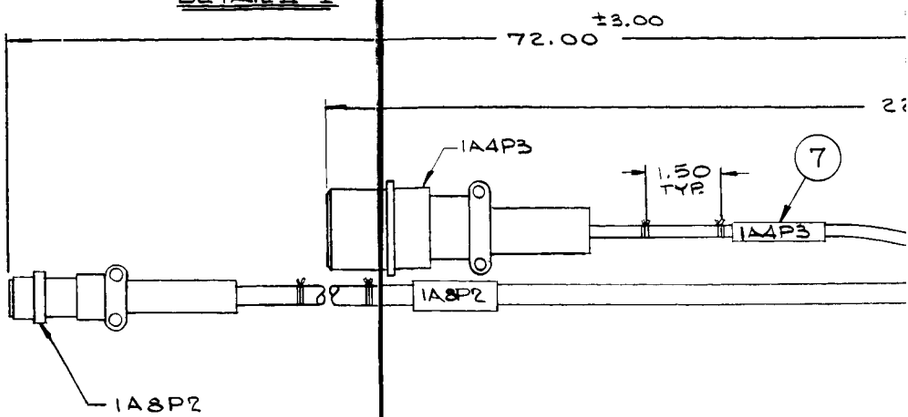


Figure 30. Reduction Gear Assembly, RCA Dwg 1723737 Rev. B



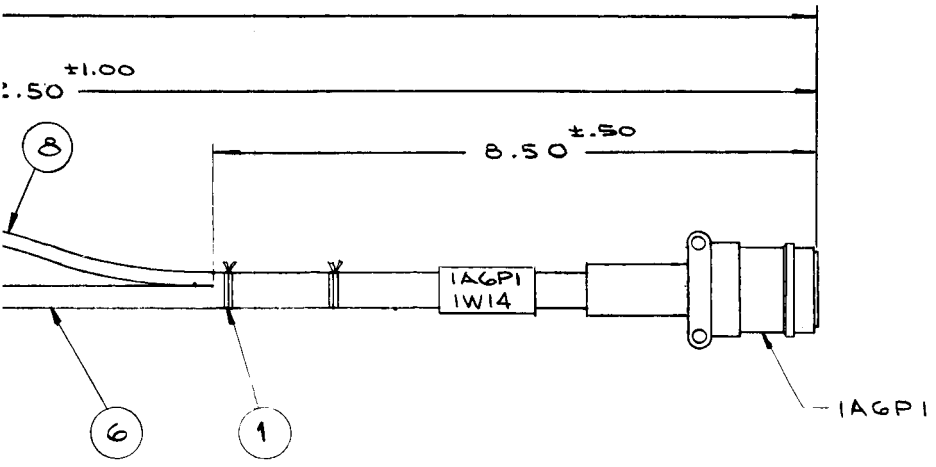
DETAIL A



CONNECTION LIST			
ITEM	FROM	TO	TO
2	1A6P1-3	1A8P2-10	———
2	1A6P1-4	1A8P2-11	———
2	1A6P1-10	1A8P2-9	———
2	1A6P1-13	1A8P2-3	———
2	1A6P1-14	1A8P2-4	———
3(SHLD)	1A6P1-37	———	1A4P3-M
3(WHT)	1A6P1-20	———	1A4P3-K
3(BLK)	1A6P1-21	———	1A4P3-A
2	1A6P1-23	———	1A4P3-B
2	1A6P1-24	———	1A4P3-C
2	1A6P1-25	———	1A4P3-D
2	1A6P1-26	———	1A4P3-E
2	1A6P1-28	1A8P2-12	———
2	1A6P1-29	1A8P2-13	———
2	1A6P1-30	1A8P2-14	———
2	1A6P1-31	1A8P2-15	———
2	1A6P1-32	1A8P2-16	———
2	1A6P1-33	1A8P2-5	———
3(WHT)	1A6P1-34	1A8P2-18	———
3(BLK)	1A6P1-35	1A8P2-19	———
3(SHLD)	1A6P1-18	1A8P2-8	———

SEE DETAIL A

SEE DETAIL A



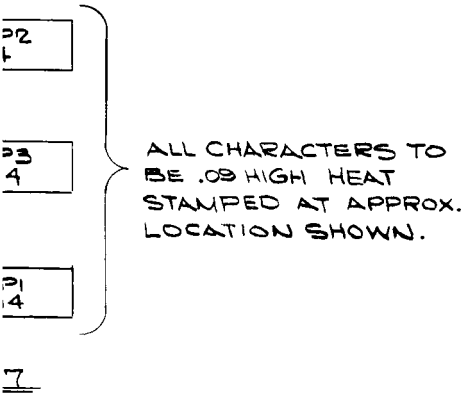
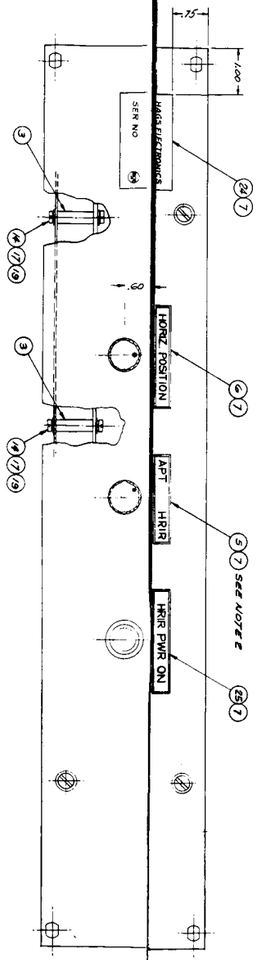


Figure 31. Adapter Harness 1W14,
RCA Dwg 1848271



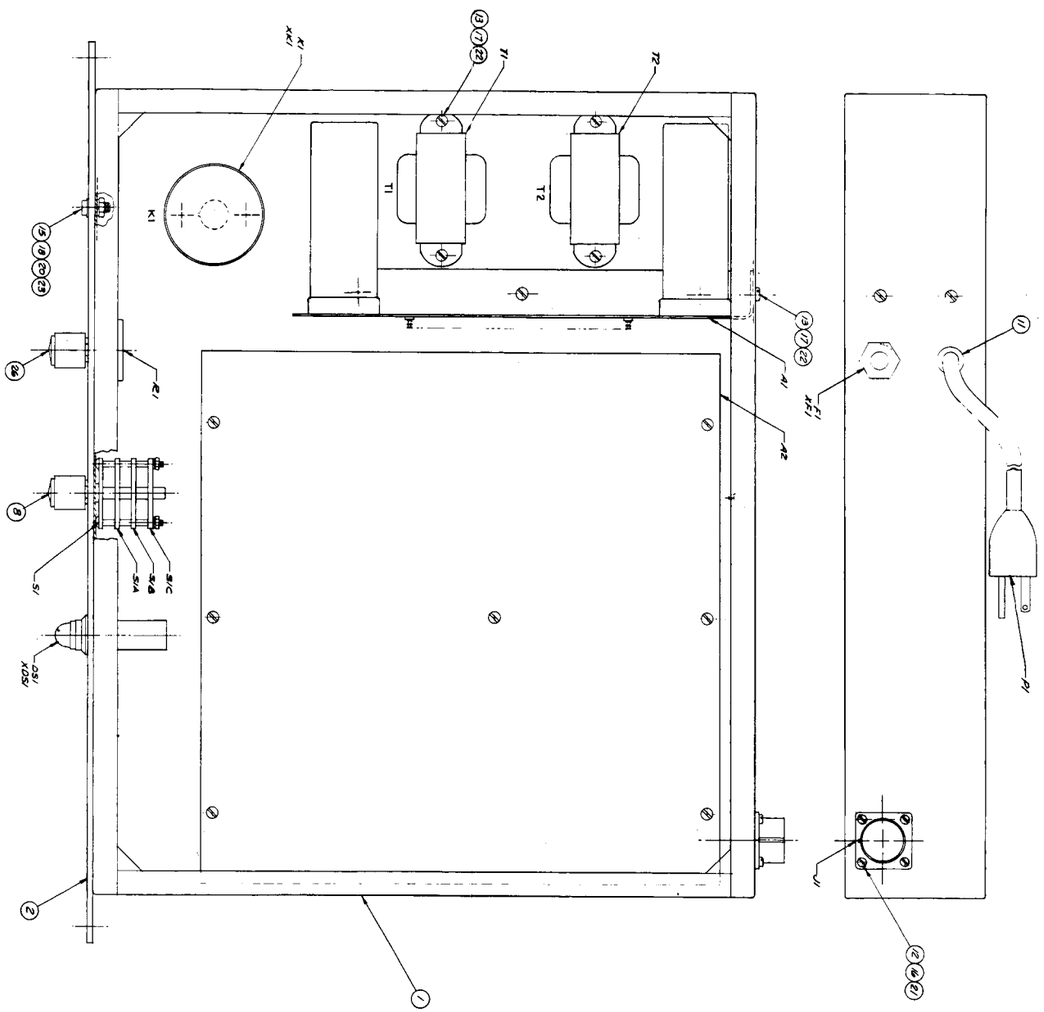
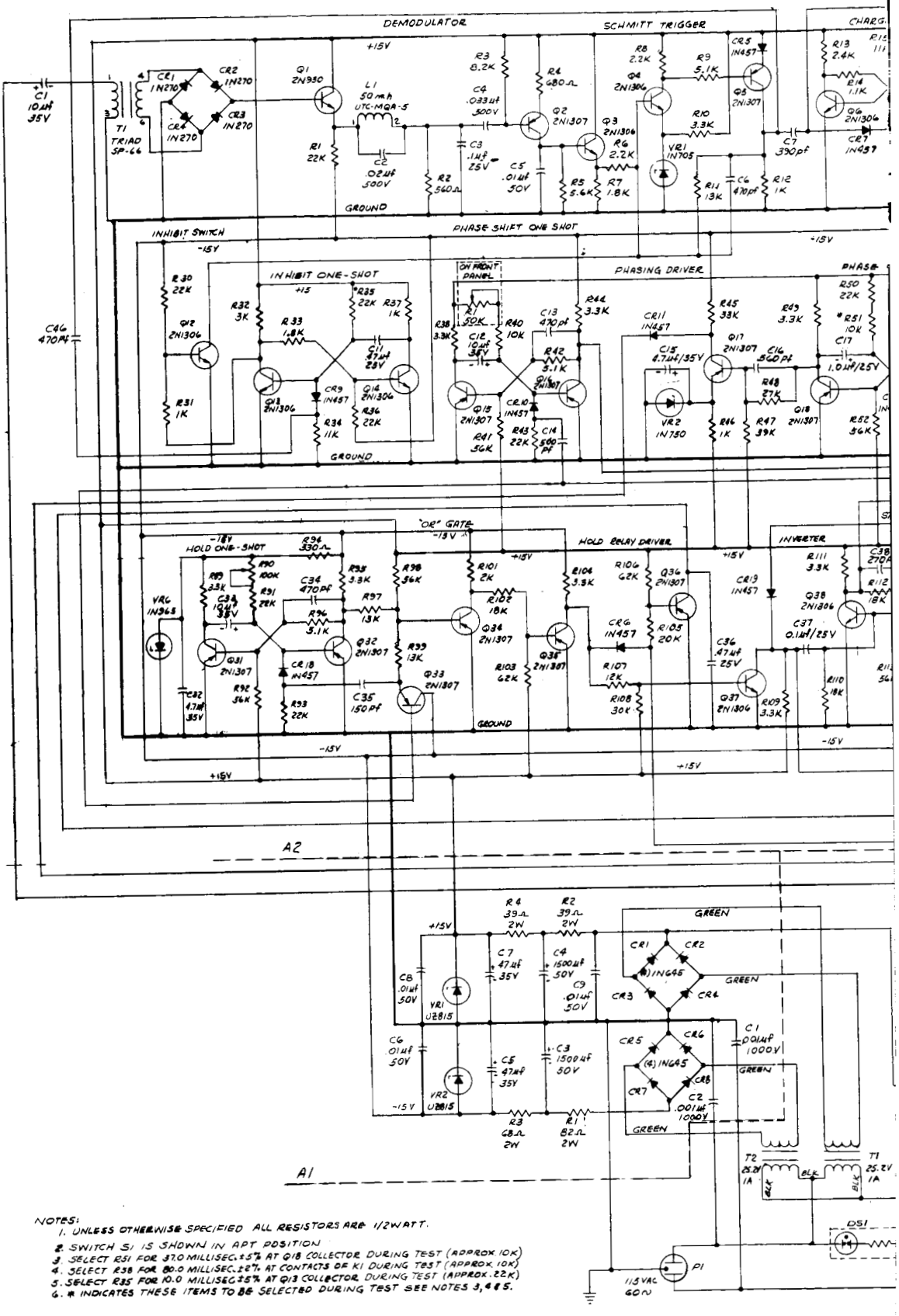


Figure 32. HRIR Converter Assembly, RCA Dwg 1723499 Rev. A


DEMODULATOR
SCHMITT TRIGGER
+15V
GROUND
INHIBIT SWITCH
-15V
INHIBIT ONE-SHOT
PHASE SHIFT ONE SHOT
ON FRONT PANEL
PHASING DRIVER
"OR" GATE
HOLD ONE-SHOT
HOLD RELAY DRIVER
INVERTER
A2
A1
GREEN
115 VAC 60 ~
NOTES:
1. UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE 1/2 WATT.
2. SWITCH S1 IS SHOWN IN APT POSITION
3. SELECT R51 FOR 37.0 MILLISEC. ±5% AT Q18 COLLECTOR DURING TEST (APPROX 10K)
4. SELECT R38 FOR 80.0 MILLISEC. ±2% AT CONTACTS OF K1 DURING TEST (APPROX. 10K)
5. SELECT R35 FOR 10.0 MILLISEC ±5% AT Q13 COLLECTOR DURING TEST (APPROX. 22K)
6. * INDICATES THESE ITEMS TO BE SELECTED DURING TEST SEE NOTES 3, 4 & 5.

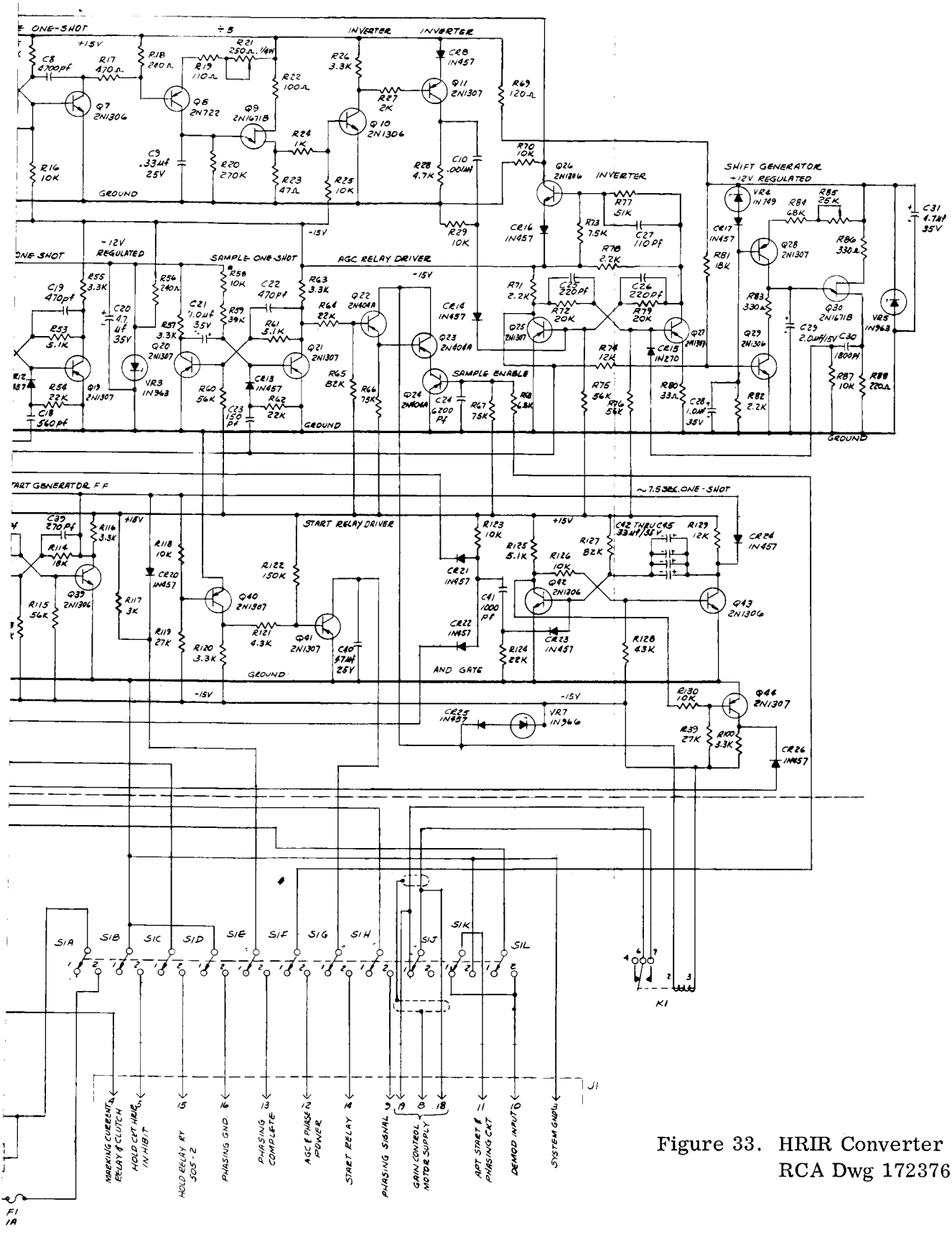
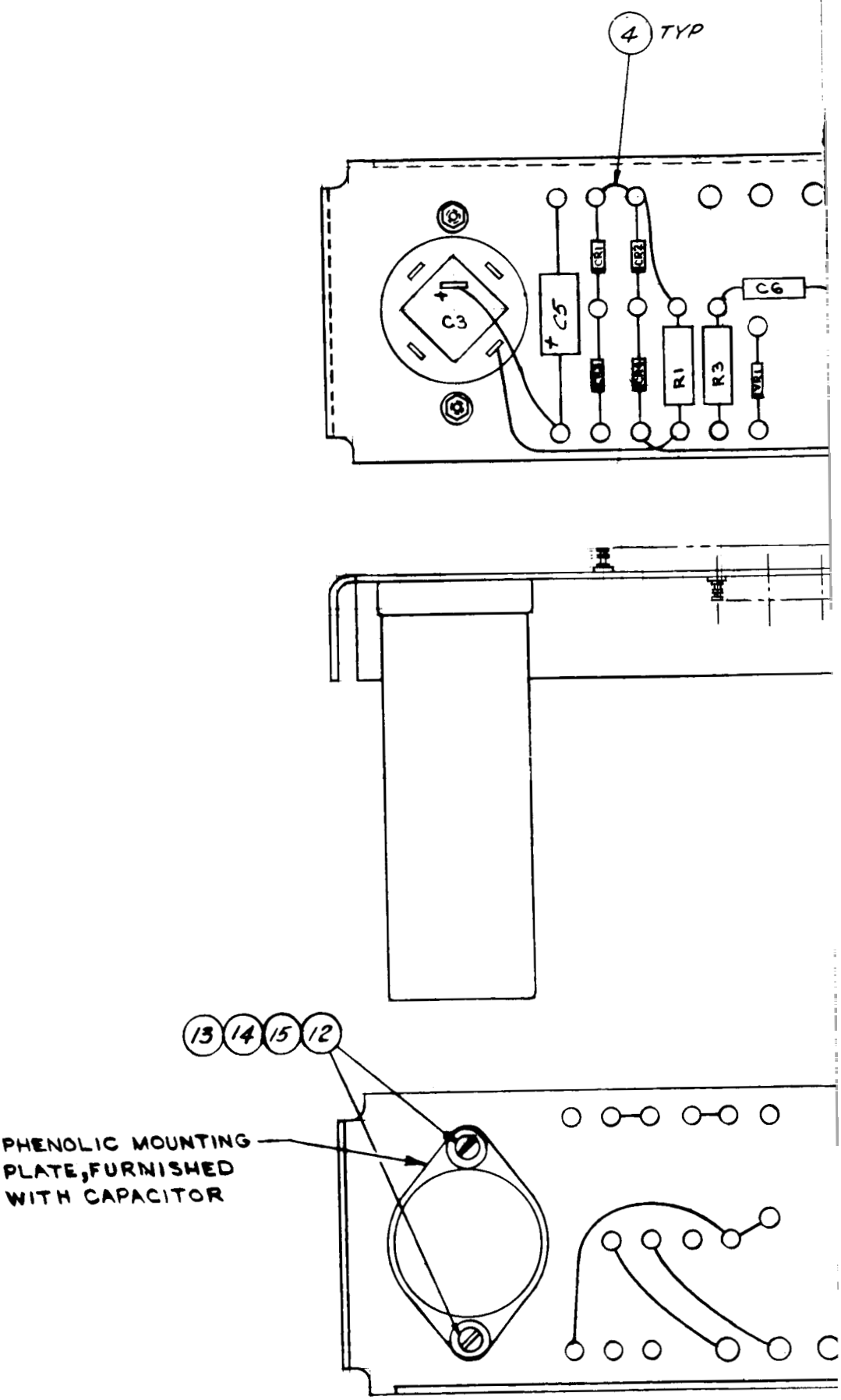


Figure 33. HRIR Converter Schematic, RCA Dwg 1723763


4 TYP
C3
+
C5
CR1
CR2
C6
R1
R3
13
14
15
12
PHENOLIC MOUNTING PLATE, FURNISHED WITH CAPACITOR

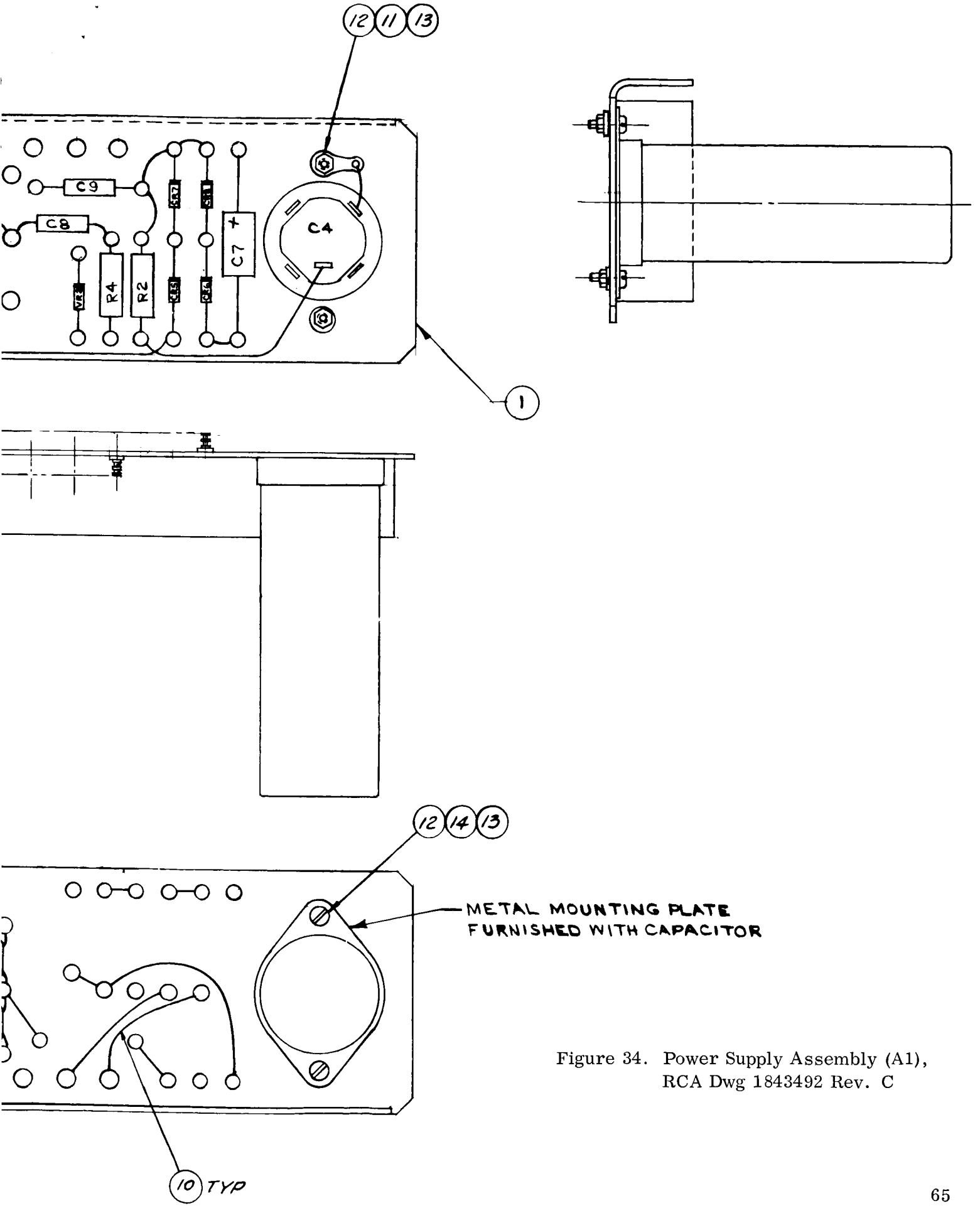
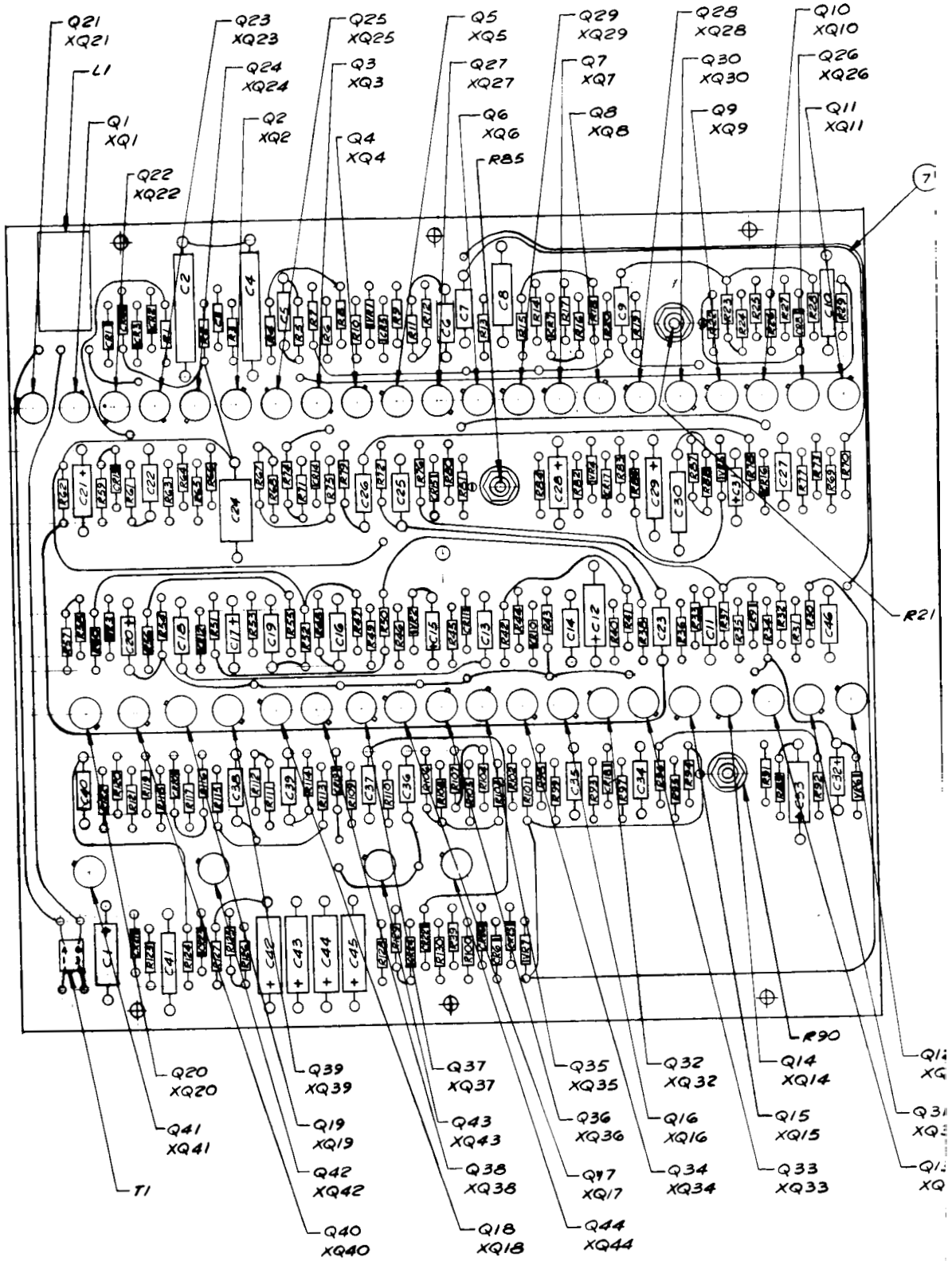


Figure 34. Power Supply Assembly (A1), RCA Dwg 1843492 Rev. C



COMPONENT SIDE

NOTES:-

1. BAR END OF CR'S & VR'S INDICATE CATHODE

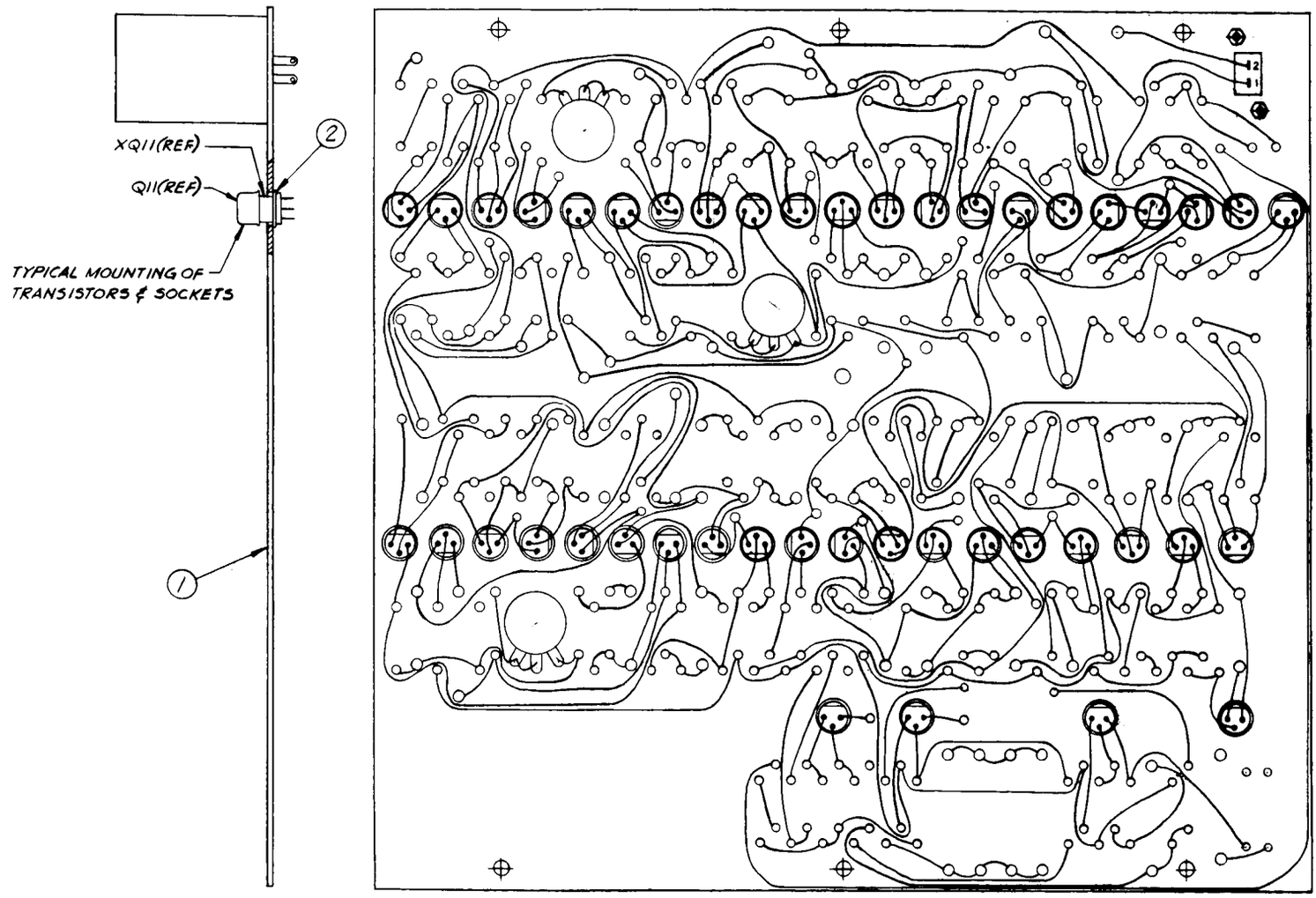


Figure 35. Component Board Assembly (A2), RCA Dwg 1843905 Rev. A